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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 9, NUMBER 9
MAY 1, 1976

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 9, NUMBER 9
MAY 1, 1976

W76-04001 -- W76-04500

e Secretary of the U.S. Department of the Interior has de-
mined that the publication of this periodical is necessary in the
nsaction of the public business required by law of this Depart-
ment. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the Bio-Science Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
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09 MANPOWER, GRANTS, AND FACILITIES
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

PREDICTIVE USE OF CATCHMENT OUTPUTS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-04145

2A. General

PREDICTION IN CATCHMENT HYDROLOGY.
Australian Academy of Science, Camberra.
A National Symposium on Hydrology, 25-27 November 1975. Australian Academy of Science, Canberra, Australia, (1975). 482 p, Chapman, T.G., and Dunin, F.X. (eds).

Descriptors: *Conferences, *Model studies, *Watersheds(Basins), *Forecasting, *Reviews, Water balance, Water quality, Synthetic hydrology, Time series analysis, Hydrologic data, Rainfall-runoff relationships, Urban hydrology, Watershed management.

The twenty-one invited papers are presented. The theme of the symposium was an examination of the extent to which useful predictions can be made in a range of situations, with emphasis on the complexities of the real world. Topics covered include physical processes in surface hydrology, catchment models (including application to urban areas), water quality models, input and output series, data needs, and trends in catchment modelling. (See W76-04129 thru W76-04147) (CSIRO)
W76-04128

NUMERICAL METHODS FOR PREDICTING PRECIPITATION IN CATCHMENT HYDROLOGY,
Australian Numerical Meteorology Research Centre, Melbourne (Australia).
For primary bibliographic entry see Field 2B.
W76-04129

METHODS OF DETERMINING AREAL RAINFALL FROM OBSERVED DATA,
Bureau of Meteorology, Melbourne (Australia).
For primary bibliographic entry see Field 2B.
W76-04130

THE INTERCEPTION PROCESS,
For primary bibliographic entry see Field 2I.
W76-04131

INFILTRATION OF WATER INTO SOIL,
Commonwealth Sceintific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 2G.
W76-04132

MOVEMENT OF SOIL AND SHALLOW GROUNDWATER,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Research Management.
For primary bibliographic entry see Field 2G.
W76-04133

OVERLAND FLOW,
Melbourne and Metropolitan Board of Works Melbourne (Australia).
For primary bibliographic entry see Field 2E.
W76-04134

STREAMFLOW IN CATCHMENT MODELLING,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W76-04135

TRANSPORT OF MATERIALS IN STREAMS,
Melbourne Univ., Parkville (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W76-04136

EVAPORATION FROM CATCHMENTS,
Commonwealth Scientific and Industrial Research Organization, Mordialloc (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2D.
W76-04137

SPECIAL CHARACTERISTICS OF URBAN HYDROLOGY,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Progeam.
M. B. McPherson.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 239-255. 1 fig, 1 tab, 48 ref.

Descriptors: *Reviews, *Model studies, *Urban hydrology, Urbanization, Urban runoff, Cities, Rainfall-runoff relationships, Design data, United States.

The field of urban hydrology is distinguished from classical hydrology both in terms of subject matter and in the organization and support of research. A review is provided of current activity and expected directions in the field in the U.S.A. The more widely used models are classified into planning, design/analysis, and operation types, and recent developments in the formulation and use of each type are reviewed, together with recent attempts to evaluate and compare them. Considerations affecting the selection of input precipitation data for a chosen model are discussed. (See also W76-04128) (CSIRO)
W76-04138

CATCHMENT MODELS FOR URBAN AREAS,
Snowy Mountains Engineering Corp., Cooma (Australia).
A. P. Aitken.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 257-275. 2 fig, 20 ref.

Descriptors: *Model studies, *Urban hydrology, *Australia, Cities, *Urban runoff, Rainfall-runoff relationships, Design data, *Reviews.

A general review of problems associated with catchment modelling in urban areas is presented. The particular characteristics of Australian urban catchments are discussed, and appropriate existing models suggested for use in relation to the various types of problems encountered. Attention is drawn to the deficiency in available data in Australia, and in research efforts directed towards determining accuracy requirements for the models. (See also W76-04128) (CSIRO)
W76-04139

USE OF PHYSICAL PROCESS MODELS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
F. X. Dunin.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, 1975. p 277-291. 1 fig, 27 ref.

Descriptors: *Reviews, *Mathematical models, *Watersheds(Basins), *Rainfall-runoff relationships, Model studies, Watershed management, Education, Research and development.

Process models are those in which hydrologic processes occurring within a catchment are represented as equations whose parameters may be derived from measurable features of the catchment; typically the catchment is conceived as a series of water stores with flows between them whose properties are based on the principles of energy exchanges and mass transport. Concepts associated with the development of such models are reviewed, and their potential uses in predicting, analysing and managing catchment responses are discussed. It is suggested that they have particular advantages in education, and in co-ordination of research and practical issues. Potential future developments in the field are indicated. (See also W76-04128) (CSIRO)
W76-04140

EMPIRICAL METHODS AND APPROXIMATIONS IN THE DETERMINATION OF CATCHMENT RESPONSE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 4A.
W76-04141

MODEL EVALUATION, TESTING AND PARAMETERS ESTIMATION IN HYDROLOGY,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. H. Pilgrim.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 305-333, 3 fig, 76 ref.

Descriptors: *Reviews, *Model studies, *Testing procedures, *Watersheds(Basins), On-site tests, Evaluation, Forecasting, Calibrations, Water yield, Rainfall-runoff relationships.

Four levels of evaluation are necessary before a model should be applied to predict the output from a catchment. These are: rational evaluation of the structure of the model itself, estimation of the parameters for the particular catchment, testing the fitted model for accuracy, and estimating its range of applicability. In a review of evaluation methods, emphasis is placed on the general principles of calibration and testing. All assessments must be made relative to the particular objectives of the model application. (See also W76-04128) (CSIRO)
W76-04142

MODELLING WATER QUALITY,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
For primary bibliographic entry see Field 5B.
W76-04143

SYNTHETIC INPUT DATA TIME SERIES FOR CATCHMENT MODEL TESTING,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
M. J. Goodspeed, and C. L. Pierrehumbert.
In: Predicition in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 359-370, 1 tab, 30 ref.

Descriptors: *Reveiws, *Model studies, *Watersheds(Basins), *Testing procedures, *Synthetic hydrology, Rainfall, Statistical methods, Forecasting, Rainfall-runoff relationships, Rainfall distribution, *Time studies analysis, Stochastic processes, Probability.

The use of synthetic input data for catchment model validation and parameter estimation is outlined. Attention is directed principally to the generation of synthetic precipitation data. These procedures are usually considered in relation to events at a single point where historical data are characterised statistically and used as the basis for projection. However, data generated as a result of spatial interpolation or regionalization of a small number of events are equally synthetic, and some techniques used in these processes are discussed. The stochastic processes and probability distributions considered appropriate vary markedly with the time interval between samples used and some examples of these are given. An example of the generation of synthetic data for model optimization is also presented. (See also W76-04128) (CSIRO)
W76-04144

DATA NEEDS, AQUISITION, AND AVAILABILITY FOR HYDROLOGIC MODELS,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 7C.
W76-04146

TRENDS IN CATCHMENT MODELLING,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
T. G. Chapman.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 459-482, 4 fig, 44 ref.

Descriptors: *Reviews, *Model studies, *Forecasting, *Watersheds(Basins).

Recent progress in catchment prediction is reviewed with the aim of suggesting areas for future development. The trend towards models with a structure related to the physics of hydrological processes is expected to continue, but it will lead to only marginal advances in prediction capability unless more emphasis is placed on evaluation of catchment parameters. The constraints on significant advances will then be data aquisition and the cost of implementing more realistic models. Problems associated with extending predictions to a real (as opposed to a time-invariant) catchment are also considered. (See also W76-04128) (CSIRO)
W76-04147

RESEARCH PROGRAM - HYDROLOGY RESEARCH DIVISION - SUMMARIES OF PROGRESS AND SHORT RESEARCH REPORTS.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Report Series No 42, 1975. 120 p, 29 fig, 10 tab.

Descriptors: *Hydrology, *Projects, *Programs, *Research and development, Forecasting, Model studies, *Canada.
Identifiers: *Hydrogeologic research, Geophysical studies, Groundwater studies, Forecast models, GOWN program.

Presented are a series of brief papers and reports on various aspects of research programs in progress in the hydrology research division, of the Water Resources Branch, Inland Waters Directorate, Environment Canada. These programs are involved in developing hydrologic techniques and methodologies for water resource management, and identifying operational areas in the water resource field where there are needs for research and implementing appropriate research projects and programs. (Environment Canada)
W76-04239

USES OF WATER RESOURCES DATA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04255

THE EFFECT OF CLIMATE ON THE CHEMISTRY OF CARBONATE GROUNDWATER,
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 2F.
W76-04297

A GENERALIZED TENSOR FORMULATION OF ATMOSPHERE AND SEAS DYNAMICS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
L. M. Avis, R. E. Turner, and T. H. Rees.
Available from the National Technical Information Service, Springfield, Va 22161. Technical Report NASA TR R-441, September 1975. 64 p, 11 ref, 6 append.

Descriptors: *Fluid mechanics, *Model studies, *Mathematical models, Atmosphere, Oceans, Computer models, Simulation analysis, Numerical analysis, Equations, Gravity waves, Mixing, Movement.
Identifiers: Time-dependent metrics, Geophysical fluids.

A new generalized mathematical model was developed for simulation of the dynamics and transport of both the atmosphere and seas. A nearly horizontal bottom coordinate surface conforms to the land-to-air interface and the sea-floor-to-water interface, which simplifies computations. General vertical motion of the other quasi-horizontal coordinate surfaces was allowed; thus, external gravity waves can be represented by the top coordinate surface, and meteorological fronts and inversion layers in the atmosphere and refractive layers in the seas can be represented with enhanced resolution by the internal quasi-horizontal coordinate surfaces. A tensor reformulation of the standard subgrid mixing theory departed significantly from the standard theory in allowing, as a solution under adiabatic conditions, rigid-body rotation of the atmosphere. (Sims-ISWS)
W76-04317

DIGITAL MODEL SIMULATION OF THE GLACIAL-OUTWASH AQUIFER AT DAYTON, OHIO.
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 2F.
W76-04409

2B. Precipitation

CLIMATIC ASPECTS OF FROST WEATHERING IN THE UPPER MOUNTAINOUS REGIONS, (IN GERMAN),
Bern Univ. (Switzerland). Geography Institut.
For primary bibliographic entry see Field 2C.
W76-04020

CONTINENTAL ICE SHEETS: CONDITIONS FOR GROWTH,
Colorado Univ., Boulder. Dept. of Geography; and Colorado Univ., Nederland. Inst. of Arctic and Alpine Research.
For primary bibliographic entry see Field 2C.
W76-04100

STORM WAVE CLIMATES AT CAPE HATTERAS, NORTH CAROLINA: RECENT SECULAR VARIATIONS,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2L.
W76-04101

NUMERICAL METHODS FOR PREDICTING PRECIPITATION IN CATCHMENT HYDROLOGY,
Australian Numerical Meteorology Research Centre, Melbourne (Australia).
D. J. Gauntlett, and L. M. Leslie.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 33-45. 5 fig, 25 ref.

Descriptors: *Reviews, *Forecasting, *Rainfall, *Numerical analysis, *Model studies, Weather forecasting, Synoptic analysis, Watersheds(Basins).

The problem and potential of using numerical weather prediction models to forecast, in a dwterministic sense, meso-scale rainfall for catchment purposes and reviewed. A broad technical framework is presently available which may in the long term provide a capability for short-range prediction far in excess of present-day synoptic and statistical methods. However, refinements are necessary in certain key areas, notably in the scale of resolution relative to that required for catchment studies, in determining methodology for specifying initial states in the meso-scale, and in understanding the physical factors contributing to the precipitation process. (See also W76-04128) (CSIRO)
W76-04129

METHODS OF DETERMINING AREAL RAINFALL FROM OBSERVED DATA,
Bureau of Meteorology, Melbourne (Australia).
A. J. Hall, and P. A. Barclay.
Hydrology, Australian Academy of Science, Canberra, Australia, 1975. p 47-57. 1 tab, 49 ref.

Descriptors: *Reviews, *Estimating, *Rainfall, *Measurement, *Radar, Watersheds(Basins), Model studies, Rainfall-runoff relationships, Rainfall disposition, Rain gages.

An accurate assessment of areal rainfall is a necessary basic input to rainfall-runoff models, particularly conceptual models which emphasise a complete water balance. The success of such models is restricted by the normally sparse, unevenly distributed network of point gauges available. The more commonly used methods of calculating areal rainfall from point gauge data are listed and compared, and the errors incurred by their use are discussed. Radar measurement of areal rainfall is considered as an alternative. (See also W76-04128) (CSIRO)
W76-04130

FURTHER CLIMATOLOGICAL STUDIES OF BAFFIN ISLAND, NORTHWEST TERRITORIES,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
R. G. Barry.
Technical Bulletin No 65, 1974. 54 p, 53 fig, 13 tab, 18 ref, append.

Descriptors: *Climatology, *Precipitation(Atmospheric), *Evaporation, Arctic, Methodology, Analytical techniques, Statistical methods, *Classification, Moisture, *Maps, *Canada.
Identifiers: Moisture flux divergence, Horizontal vapour transport, *Baffin Island(NWT), Moisture budget estimates, Synoptic weathermaps.

This report concludes the program of climagological investigations of Baffin Island begun in September 1966 as a part of the Baffin Island project of the Department of Energy, Mines and

Resources and continued under project 16 of the land-based ice studies. Results are presented of work between October 1968 and July 1971 at the Institute of Arctic and Alpine Research, University of Colorado, Boulder. The objectives of this study are to provide information on the moisture flux divergence and sources of precipitation over the Eastern Canadian Arctic. A classification of synoptic weather maps into types is also included. (Environment Canada)
W76-04259

A GENERALIZED TENSOR FORMULATION OF ATMOSPHERE AND SEAS DYNAMICS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 2A.
W76-04317

2C. Snow, Ice, and Frost

CHEMICAL COMPOSITION OF SNOW IN THE EAST CENTRAL SIERRA NEVADA,
Max C. Fleishmann Coll. of Agriculture, Reno, Nev.
J. C. Brown, and C. M. Skau.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 495, $3.50 in paper copy, $2.25 in microfiche. Nevada Center for Water Resources Research, Desert Research Institute, Reno, Publication AG-1, November 1975. 13 p, 1 fig, 4 tab, 14 ref. OWRT A-062-NEV(1). 14-31-0001-5028.

Descriptors: Snow, Snow melt, *Nitrogen, *Phosphorus, *Nevada, Sampling, Water quality, Chemical properties, Pollutant identification.
Identifiers: *Sierra Nevada Mountains(Nev).

The chemical quality of snowfall in the east-central Sierra Nevada Mountains was measured four times at twenty-six sampling points during the period January to April, 1975. Mean concentrations (ppm) and total production (lbs/mi sq) of eleven major chemical constituents are reported. These values were related to six sampling site characteristics, using simple correlation techniques, to determine the factors which influence the chemical variability of snowfall over this area. Chemical concentrations in the snow here are, apparently, much lower than for precipitation reported in other parts of the country. Nitrogen and phosphorus concentrations, however, are similar to those found in small, eastern Sierra streams. The chemical concentrations in snowfall exhibit little variability between sampling sites. This suggests atmospheric concentrations of these constituents are relatively uniform over the area, with localized human activity having, apparently little influence. The dominant factor causing variation of winter production values (lbs/mi sq) between sites is simply the amount of precipitation. (Fallon-Nevada)
W76-04018

CLIMATIC ASPECTS OF FROST WEATHERING IN THE UPPER MOUNTAINOUS REGIONS, (IN GERMAN),
Bern Univ. (Switzerland). Geography Institut.
H. Mathys.
Mitt Naturforsch Ges Bern. 31: 49-62. 1974.

Descriptors: *Temperature, Mountains, Frost action, Climate, Humidity, *Weathering, *Frost leaving, Fog.
Identifiers: *Switzerland.

The thermal effects of the atmosphere on the lithosphere on the eastern ridge of the Jungfrau peak (Switzerland) were studied. Variations in the surface temperatures of rocks are greater than those of air temperatures. Even in the permafrost region, rock temperatures may be 4 times those of the air. Heat and cold are moderated toward the center of a rock. At a depth of 40 cm when the surface temperature was 44C, the inside of a rock was 6C and the temperatures took 9 h to equalize. The southern slope froze and thawed on 196 days in 1972 while this occurred on only 22 days on the northern slope. Dark surfaces at 3700 m reached 43C and light areas reached 33C. The amplifying and inhibiting effects of wind, fog and humidity are also discussed. Compressive stress due to as many as 6 freezing and thawing cycles per day lead to fatigue in rocks and fissures and layers are formed allowing deeper penetration of heat and cold.--Copyright 1975, Biological Abstracts, Inc.
W76-04020

CONTINENTAL ICE SHEETS: CONDITIONS FOR GROWTH,
Colorado Univ., Boulder. Dept. of Geography; and Colorado Univ., Nederland. Inst. of Arctic and Alpine Research.
R. G. Barry, J. T. Andrews, and M. A. Mahaffy.
Science, Vol. 190, No. 4218, p 979-981, December 5, 1975. 2 fig, 37 ref. NSF GA-40248.

Descriptors: *Ice cover, *Remote sensing, *Climatology, *Canada, Glaciation, Temperature, Snow, Glaciers, Lichens, Model studies, Mathematical models, Climatic data, Cold regions, Water levels, Sea level.
Identifiers: *Continental ice sheets, *Baffin Island, Labrador, ERTS.

The conditions required for the development of major ice sheets in eastern Canada appear to have been approximated by those of the Little Ice Age in the 17th through the 19th centuries. Former extensive snowbanks from this period have been mapped from lichen-free terrain visible on Earth Resources Technology Satellite imagery. The climatic changes required to initiate the necessary snow line lowering may involve only a minor summer cooling. Simulations with an ice-flow model reproduced plausible ice centers, but the rate of ice sheet buildup is slower than that suggested by geological evidence of world sea level lowering from 120,000 to 115,000 years before the present. (Sims-ISWS)
W76-04100

SPLINE APPROXIMATION TO THE FREEZING OF WATER IN A CYLINDRICAL HOLE DRILLED IN AN ICE SHEET,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. Takagi.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A006 581, $3.50 in paper copy, $2.25 in microfiche. Research Report 328, February 1975. 13 p, 2 ref, 1 append.

Descriptors: *Boreholes, *Ice, *Glaciology, *Freezing, Model studies, Mathematical models, Equations, Glaciers, Cold regions.
Identifiers: *Ice sheets.

An interpolation continuous up to the first-order derivatives was needed to solve the problem of freeze-back of water in a cylindrical borehole drilled in an ice sheet, because of the first-order derivatives were used in the formulation of the movement of the freezing front. The requirement was met by use of a parabolic spline. The Crank-Nicholson formula was used to set up the predictor-corrector scheme of time integration. Several iterations were needed to advance one step in time because of the implicit nature of the Crank-Nicholson formula and the nonlinearly involved in the freezing problem. (Sims-ISWS)
W76-04105

ANALYSIS OF THE FREEZEBACK OF WATER IN A CYLINDRICAL BOREHOLE DRILLED IN AN ICE SHEET,
Cold Regions Research and Engineering Lab., Hanover, N.H.
S. Takagi.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 693, $3.50 in paper copy, $2.25 in microfiche. Research Report 323, September 1974. 12 p, 2 fig, 2 ref.

Descriptors: *Boreholes, *Ice, *Glaciology, *Freezing, Model studies, Mathematical models, Equations, Glaciers, Cold regions.
Identifiers: *Ice sheets.

The rigorous solution was presented of the freezeback of water in a cylindrical borehole drilled in an ice sheet floating on water, based on the assumptions that the temperature distribution does not depend on the vertical direction and the temperature of the water in the borehole is the freezing temperature. The solution was found by using the thickness of the newborn ice in place of time. Because of the complexity of the analysis, the solution can be found only for the first few terms of the series solution. Numerical computation of the solution thus found by use of the first few terms of the series solution yielded the growth curve of the newborn ice that reaches maximum at a certain time. The solution ceased to be valid before the time of the maximum is reached. (Sims-ISWS)
W76-04106

DEFORMATION AND FLOW OF BARNES ICE CAP - BAFFIN ISLAND,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
G. Holdsworth.
Scientific Series No 52, 1975, 19 p, 17 fig, 5 tab, 21 ref.

Descriptors: *Ice, *Methodology, *Instrumentation, Mathematical studies, Flow measurement, Surveys, Migration, Surges, Stations, Surfaces, Velocity, *Canada.
Identifiers: *Barnes Ice Cap, *Baffin Island, *Flow Law, Mass balance measurements, Strain rates, Divide, Northwest Territories.

Measurements taken in 1970 and 1971 of the positions of 43 surface stations along a transect (10.4 km long) from the divide to the northeast margin of the south dome of Barnes Ice Cap, have enabled surface velocities and strain rates to be computed along surface 'flow lines' generated from the velocity distribution. Using a variation of a method developed by Budd (1969), the parameters in the flow law are determined for the stress range. From the measured vertical velocities of the ice and the buildup of superimposed ice over the period 1970-73, it appears that this part of the ice-cap surface is rising. This is not necessarily the case elsewhere or when averaging is done over longer periods of time. More data are required before it is known whether the divide is stable or is still migrating, as the result of a surge. (Environment Canada)
W76-04151

GLACIER SURVEYS IN BRITISH COLUMBIA - 1970,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
I. A. Reid, and J. O. G. Charbonneau.
Report series No 32, 1975, 23 p, 11 fig, 41 tab, 6 ref, 6 maps.

Descriptors: *Glaciers, *Surveys, Streamflow, Maps, Runoff, Methodology, Photogrammetry, Analytical techniques, Water quantity, On-site investigations, *Canada.
Identifiers: Volumetric changes, Directional changes, Areal changes, Linear changes, *British Columbia, Sentinel Glacier, Kokanee Glacier,

Nadahini Glacier, Sphinx Glacier, Sentinel Glacier.

Glaciers act as natural regulators, storing water in winter and releasing it in summer. To gain some understanding of this phenomenon and the contribuiton which glacier surveys in 1945. The earlier surveys offered some clue to the role of the glacier, but the data collected were not sufficient to provide the overall picture. Following adoption of photogrammetric survey techniques, however, the glacier surveys have evolved to the extent that it is now feasible to produce a series of maps from which the linear, areal, directional and volumetric changes can be determined. The surveys have revealed that the glaciers, in general, are becoming smaller in size; hence the regulation effect is diminishing. (Environment Canada)
W76-04154

LIGHT TRANSMISSION THROUGH SNOW AND ICE,
Department of the Environment, Burlington (Ontario). Inland Waters Branch.
R. J. Maguire.
Technical Bulletin No 91, 1975. 4 p, 1 fig, 2 tab, 13 ref.

Descriptors: *Snow, *Ice, *Photosynthesis, Lakes, Measurement, Light, Instrumentation, Forecasting.
Identifiers: *Light transmission, Oxygen concentration, Illumination, Thickness, Sensors, Pyranometers.

The transmission of photosynthetically active radiation (400-700 nm) by snow and ice has been examined and extinction coefficients have been determined for clear ice, cloudy ice, soft new snow and hard powder snow. These values have been used to predict, to a satisfactory degree, the transmission of light by snow - ice systems of varying composition and thickness. (Environment Canada)
W76-04178

EFFECTS OF ICE AND SNOW COVER ON TRANSMISSION OF LIGHT IN LAKES,
Department of the Environment, Burlington (Ontario). Inland Waters Directorate.
R. J. Maguire.
Scientific Series, No 54, 1975. 24 p, 1 fig, 4 tab, 65 ref.

Descriptors: *Ice, *Snow cover, *Lakes, Effects, Temperature, Transportation, Biology, *Photosynthesis, Absorption, Filters, Equations, Depth, Freshwater, Migration, Cycles, Light, *Canada, Reviews, Measurement, Instrumentation, Iced lakes.
Identifiers: *Light transmission, Manitoba, Meteorological conditions, Strata, Water mass, Chemical constitution, Albedo, Morphometry, Pyranometers.

A review is presented of some chemical and biochemical effects of ice and snow cover on lakes. Particular attention is given to the attenuation of photosynthetically active light by ice and snow cover, and the resulting decrease in the amount of dissolved oxygen in lakes. Instrumental methods of light measurement in the field are discussed briefly, and an account is given of the complex terminology of light measurement. (Environment Canada)
W76-04179

PREDICTING PROFILES OF SNOWDRIFTS IN TOPOGRAPHIC CATCHMENTS,
Forest Service (USDA), Laramie, Wyo. Rocky Mountain Forest and Range Experiment Station.
R. D. Tabler.
In: Proceedings, Western Snow Conference (San Diego, California; April 1975), 43, p 87-97. (1975) 11 fig, 1 tab, 3 ref.

Descriptors: *Snowdrifts, *Snowpacks, Slopes, Highways, Roadbanks, Embankments, *Snow cover, *Computer programs, *Blizzards, Roads, *Snow removal, Topography, Mountains, Road design, Shear stress, Strip mines, Regression analysis, Snow surveys, Water yield improvement, Snow management, Land reclamation, Wyoming, Colorado.
Identifiers: Snow control, Snow protection, Blowing snow, Drifting snow, Terrain reshaping, Stripmine rehabilitation, Snow accumulation.

A regression model was developed that requires only terrain data to estimate snowdrift profiles. Results from sites in Wyoming and Colorado show drift slopes to be influenced by the terrain from 45 m (150 ft) upwind to an equal distance downwind of the catchment lip. Observed drift profiles are closely duplicated when the regression equation is used to predict the slope of successive profile increments. Results are compared to those of Finney's wind tunnel experience (1939). The Wyoming Highway Department is making this analysis a part of their earthwork computer program to help design drift-free roads. Among many other possible applications is the development of criteria for reshaping strip-mined terrain to maximize on-site retention of snowfall and regulate its areal distribution. A program listing is given for the Hewlett-Packard 9820A calculator and 9826A plotter. (Forest Service)
W76-04288

THE ENERGIES OF THE PLASTIC DEFORMATION OF PACK ICE BY RIDGING,
Washington Univ., Seattle. Artic Ice Study.
D. A. Rothrock.
Journal of Geophysical Research, Vol 80, No 33, p 4514-4519, November 10, 1975. 7 fig, 1 tab, 15 ref. NSF OPP71-04031.

Descriptors: *Sea ice, *Plastic deformation, *Model studies, *Oceans, Ice, Ice loads, Pressure, Growth rates, Mathematical models, Computer models, Cold regions, Oceanography, Energy.
Identifiers: *Pressure ridges, *Sea-ice thickness.

A large-scale area of pack ice contains ice of various thicknesses from zero to many meters. As the area deforms, thin ice is ridged into thicker ice, in a way that depends on the strain rate and the instantaneous thickness distribution. By equating the plastic work to the production of gravitational potential energy and the frictional dissipation in this ridging process, the yield curve for plastic deformation of the ice pack was related to the way ice thicknesses are redistributed by ridging. (Sims-ISWS)
W76-04299

THE FLOW OF A TWO-LAYER FLUID OVER TOPOGRAY IN A POLAR OCEAN,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
For primary bibliographic entry see Field 2L.
W76-04304

SIMULATED SNOWDRIFT PATTERNS--EVALUATION OF GEOMETRIC MODELING CRITERIA FOR A THREE DIMENSIONAL STRUCTURE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D. J. Calkins.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A007 735, $3.25 in paper copy, $2.25 in microfiche. Special Report 219, March 1975. 15 p, 3 fig, 1 tab, 12 ref, append.

Descriptors: *Snow, *Winds, *Model studies, *Scaling, Hydraulic models, Laboratory tests, Flumes, Sands, Water Snowpacks, Hydraulic similitude, Reynolds number, Froude number.
Identifiers: *Snowdrift patterns, Snow deposition, Model scales, Rosby number, Peclet number.

Simulated drifting snow patterns were examined for a single structure using fine sand and water in a hydraulic flume. Three models of the structure were constructed at different scales and the experimental data revealed that model scale had very little effect on the areal distribution patterns. Flow velocity also had very limited influence on the drift patterns, provided the channel velocity was greater than the threshold velocity of the sand particle. Lengthening the duration of the test runs made it easier to distinguish the patterns but did not change their shape. The experimental data suggested that modeling under the Reynolds number independence is satisfactory. (Sims-ISWS)
W76-04313

CASCADE PASSES AVALANCHE ATLAS, PART I: CHINOOK, CAYUSE, WHITE AND SNOQUALMIE PASSES,
Washington Univ., Seattle. Dept. of Civil Engineering; and Washington Div., Seattle. Geophysics Programs.
For primary bibliographic entry see Field 7C.
W76-04318

DEVELOPMENT OF A SEA-ICE THICKNESS GAGE--AN ATTEMPT TO USE SHEAR WAVES,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
J. H. Getman, and M. B. Moffett.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A006 599, $7.25 in paper copy, $2.5 in microfiche. Report No GC-D-44-75, May 1973. 209 p, 47 fig, 8 tab, 19 ref, 3 append. DOT-CG-24, 136-A.

Descriptors: *Ice, Sea ice, *Measurement, *Acoustics, *Arctic, Instrumentation, On-site tests, Cold regions.
Identifiers: *Sea-ice thickness, *Shear waves, Acoustic measurements.

An experimental apparatus for the measurement of the thickness of sea-ice by the use of a shear wave reflection technique was designed and constructed. The apparatus was tested extensively in the Arctic during the summer of 1972. A portion of the apparatus, the horizontal impact source, produced reliable and repeatable excitation of the ice. Unfortunately, the measurement of the thickness of sea ice by the use of a shear wave reflection technique was not as simple as was anticipated, primarily due to the difficulty of properly exciting the ice and to the mode conversion of the acoustic energy by external and internal features of the ice. (Sims-ISWS)
W76-04320

CORRELATION ANALYSIS OF WIND AND ICE DRIFT DATA TAKEN AT LINCOLN BAY 1972,
Defence Research Establishment, Ottawa (Ontario).
V. Jones.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A007 089, $3.50 in paper copy, $2.25 in microfiche. Technical Note 74-34, January 1975. 7 p, 1 tab, 1 ref, 2 append.

Descriptors: *Winds, *Sea ice, *Correlation analysis, *Arctic, Ice, Regression analysis, Mathematics, Computer programs, Coriolis force, Movement, Cold regions.
Identifiers: *Ice drift.

A set of programs were written to analyze wind and ice drift speed correlations in the data taken at Lincoln Bay in 1972. The maximum correlation for each station indicated that about 20% of the drift can be attributed to wind. The effects of time lag and Coriolis force were examined, but due to the complexity of the problem no generalization on ice floe measurement could be made. (Sims-ISWS)
W76-04322

PROBLEMS OF CALCULATING THE THERMAL RADIATION OF MULTILAYERED STRUCTURES OF THE ICE AND SNOW TYPES BY MEANS OF ORIENTED GRAPHS USING AN ELECTRONIC COMPUTER,
M. D. Rayev, Ye. A. Sharkov, T. A. Shiryayeva, and V. S. Etkin.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-33885, $4.00 in paper copy, $2.25 in microfiche. NASA Technical Translation F-15,965, October 1974. 23 p, 15 fig, 5 ref. Translated from Russian.

Descriptors: *Snow, *Ice, *Thermal radiation, Data processing, Computer programs, Computers, Model studies, Mathematical models, Radiation, Thermal properties.

An examination was made of a method of calculating the radio emission of multilayered structures with oriented graphs, computer-aided. This method makes it possible with small outlays of machine time to analyze the radio emission of complex layered structures with any number of layers in thickness and arbitrary electrical parameters. As an example, the calculation and analysis of the radio emission of layered structures of snow-ice-water, water-ice, and ice-ground types were carried out. (Sims-ISWS)
W76-04324

CRIMINAL JURISDICTION OVER ARCTIC ICE ISLANDS: UNITED STATES V. ESCAMILLA,
For primary bibliographic entry see Field 6E.
W76-04341

ICE DYNAMICS IN THE CANADIAN ARCHIPELAGO AND ADJACENT ARCTIC BASIN AS DETERMINED BY ERTS-1 OBSERVATIONS,
Department of the Environment, Ottawa (Ontario).
R. O. Ramseier, W. J. Campbell, W. F. Weeks, L. Drapier-Arsenault, and K. L. Wilson.
In: Canada's Continental Margins and Offshore Petroleum Exploration: Canadian Society of Petroleum Geologists Memoir 4, p 853-877, May 1975. 16 fig, 1 tab, 13 ref.

Descriptors: *Sea ice, Movement, *Arctic Ocean, *Tracking techniques, *Satellites(Artificial), Aerial photography, Remote sensing, Data collections, Photogammetry, Mapping.
Identifiers: *Ice dynamics, *Canadian Archipelago, *ERTS-1, Ice movement, Ice melt.

ERTS-1 'Quicklook' imagery for the period March to November 1973 has been utilized to study sea ice in the Canadian archipelago and in the adjacent Arctic basin. The imagery, which provides extensive coverage of the area of interest, contains detailed information on variations in sea ice dynamics and ice morphology on a time scale ranging from several days to seasons. Because of the sidelap of the ERTS-1 obits over the study area, recognizable ice floes could be tracked on repetitive daily images for time periods as long as 6 days. Information on ice drift velocities, compactness, floe size, fast ice and ice melt patterns, and dates of breakup and freezeup were obtained. Although details ofthe ice motion were complex, it was possible to delineate some general patterns such as the advection of ice southward through the islands of the archipelago toward Viscount Melville Sound eastward out of Lancaster Sound, and westward out of Amundsen Gulf. Ice drift velocities of greater than 58 km/day were measured in Lake Ann Strait while values of 20 to 30 km/day were common in Amundson Gulf. (Woodard-USGS)
W76-04412

2D. Evaporation and Transpiration

DRAWDOWN SOLUTIONS FOR SIMULTANEOUS DRAINAGE AND ET,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 4B.
W76-04103

EVAPORATION FROM CATCHMENTS,
Commonwealth Scientific and Industrial Research Organization, Mordialloc (Australia). Div. of Atmospheric Physics.
E. K. Webb.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 203-236, 4 fig, 146 refs.

Descriptors: *Reviews, *Evaporation, Estimating equations, Measuring, Watersheds(Basins), Vegetation effects, Canopy, Heat budget, Water vapur, Mass transfer.

Of the methods available for estimating or measuring evaporation, three are selected as being likely to have relevance in catchment prediction studies: the bulk aerodynamics formula, the heat budget technique, and the combination approach. The basic methods are described, with their refinements and complications in dealing with the vegetative canopy and spatial variations in the surface. Their possible application in catchment studies is discussed, with prospects for future developments. (See also W76-04128) (CSIRO)
W76-04137

FURTHER CLIMATOLOGICAL STUDIES OF BAFFIN ISLAND, NORTHWEST TERRITORIES,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2B.
W76-04259

2E. Streamflow and Runoff

NAVIGATION CHENNEL IMPROVEMENT AT BONNEVILLE DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04109

HIGH VELOCITY CHANNEL, SOUTH FORK COEUR D'ALENE RIVER AT WALLACE, IDAHO.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04119

MODEL STUDY OF THE BONNEVILLE NAVIGATION CHANNEL, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04122

PREDICTION IN CATCHMENT HYDROLOGY.
Australian Academy of Science, Camberra.
For primary bibliographic entry see Field 2A.
W76-04128

OVERLAND FLOW,
Melbourne and Metropolitan Board of Works Melbourne (Australia).
K. J. Langford.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 127-147. 4 fig, 2 tab, 44 ref.

Descriptors: *Reviews, *Overland flow, Mathematical studies, Surface runoff, Hydraulic models, Soil surfaces.
Identifiers: *Kinematic wave theory.

The current state of knowledge of overland flow, considered as flow generated by rainfall moving over the ground surface, is reviewed. The mathematical theory is presented, with particular reference to kinematic wave theory and its development in application to the catchment situation. Experimental hydraulic studies are also discussed with emphasis on the effects of surface roughness and uneveness. Directions of future developments in the field are suggested. (See also W76-04128) (CSIRO)
W76-04134

STREAMFLOW IN CATCHMENT MODELLING,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
E. M. Laurenson.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 149-164. 1 tab, 21 ref.

Descriptors: *Reviews, *Streamflow, *Routing, *Model studies, Streamflow forecasting, Watersheds(Basins), Channel flow, Channel morphology, Rainfall-runoff relationships.

In a review of current knowledge, the physical nature of real streamflow is first described in relation to concentration and dispersal of flow, and the relationships between channel flow and the size and form of the channel. Methods of streamflow routing and its incorporation in catchment models are then discussed against this physical background, with emphasis on the need for, and effects of, simplifying assumptions. (See also W76-04128) (CSIRO)
W76-04135

USE OF PHYSICAL PROCESS MODELS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 2A.
W76-04140

EMPIRICAL METHODS AND APPROXIMATIONS IN THE DETERMINATION OF CATCHMENT RESPONSE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 4A.
W76-04141

PREDICTIVE USE OF CATCHMENT OUTPUTS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-04145

TRENDS IN CATCHMENT MODELLING,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
For primary bibliographic entry see Field 2A.
W76-04147

SURFACE WATER DATA, BRITISH COLUMBIA 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04150

REFERENCE INDEX - CANADA 1972 - HYDROMETRIC MAP SUPPLEMENT.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04160

NIAGARA RIVER ACOUSTIC STREAMFLOW MEASUREMENT SYSTEM,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7B.
W76-04165

SURFACE WATER DATA, ALBERTA 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04168

SURFACE WATER DATA, ATLANTIC PROVINCES 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04169

SURFACE WATER DATA, SASKATCHEWAN 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04170

STREAMFLOW REGIONALIZATION IN BRITISH COLUMBIA, NO 1, REGRESSION OF MEAN ANNUAL FLOODS ON PHYSIOGRAPHIC PARAMETERS,
Environmental Protection Service, Vancouver (British Columbia). Pacific Region.
R. M. Leith.
Report Series No 40, 1975. 42 p, 2 fig, 6 tab, 4 ref, 6 append.

Descriptors: *Floods, *Streamflow, Statistical methods, *Regression analysis, Precipitation(Atmospheric), Climates, Hydrologic data, Equations, *Canada, *Regional analysis, Estimating, Forecasting.
Identifiers: *Regionalization, Physiographic parameters, Logarithmic equations, *British Columbia.

The mean annual flood has been regressed on certain physiographic parameters and climatological variables for 144 stations in seven regions of British Columbia. The prime objective was to examine regression as a rool for regionalization. If distinct regression equations could be producted for each region then regionalization would be considered effective and three results could be achieved: 1. a means of evaluating the present network, 2. identification of important physiographic parameters, 3. a means of estimating mean annual flood for ungauged basins. Distinct equations were developed. The best equations for Mean Annual Flood, M.A.F., for each region are listed. The equations were developed by backward elimination of variables and were tested by plotting residuals and with split samples. (Environment Canada)
W76-04180

SURFACE WATER DATA ATLANTIC PROVINCES 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04248

SURFACE WATER DATA, YUKON AND THE NORTHWEST TERRITORIES 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04249

SURFACE WATER DATA, MANITOBA 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04250

SURFACE WATER DATA, ONTARIO 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04256

CALCULATION OF FREE-SURFACE AERATED WATER FLOWS,
For primary bibliographic entry see Field 8B.
W76-04306

ANALYSIS AND SYNTHESIS OF FLOOD CONTROL MEASURES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-04308

ANALYSIS OF DROUGHT CHARACTERISTICS BY THE THEORY OF RUNS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
P. Guerrero-Salazar, and V. Yevjevich.
Hydrology Papers, No 80, September 1975. 44 p, 25 fig, 20 tab, 63 ref.

Descriptors: *Droughts, *Stochastic processes, *Distribution, *Time series analysis, Analytical techniques, Synthetic hydrology, Probability, Regression analysis, Frequency, Statistics, Water shortage.
Identifiers: *Theory of runs, *Water deficits, Run length, Biveriate series.

Methodologies for analysis of droughts were presented for stationary and periodic-stochastic processes. Droughts were studied by means of the theory of runs. Distributions of the longest run-length and the largest run-sum in a series of a given length, and distributions of the run-length and the run-sum of infinite series for various cases of univeriate and bivariate series were investigated. Exact, approximate, or experimentally obtained expressions were presented for univariate and bivariate independent and dependent series. For bivariate series, combinations of serially independent and dependent, and mutually independent and dependent series were studied. When exact analytical solutions could not be obtained, the data generation method was used. Frequency distributions of various drought characteristics associated with the runs, obtained by the generation method for the bivariate case, were fitted by discrete or continuous probability distribution functions. Multiple regression analysis was used to obtain useful relationships between the parameters of fitted distribution functions and the parameters of time series dependence, cross dependence, and the truncation levels. Periodic-stochastic series were studied by defining drought and its parameters for this particular type of hydrologic processes. (Singh-ISWS)
W76-04310

FROM AEROSPACE PHOTOGRAPHS TO FORECASTING AND CALCULATING FLOWS,
For primary bibliographic entry see Field 7B.
W76-04325

RIVER RUN-OFF CONTROL,
For primary bibliographic entry see Field 4A.
W76-04326

FLOW-DURATION AND LOW-FLOW FREQUENCY DETERMINATIONS OF SELECTED ARKANSAS STREAMS,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 4A.
W76-04406

MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
For primary bibliographic entry see Field 4A.
W76-04410

2F. Groundwater

RESPONSE TO TIDES OF COASTAL AQUIFERS: ANALOG SIMULATION VS. FIELD OBSERVATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
J. A. Williams, and T-C. Liu.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 473, $4.50 in paper copy, $2.25 in microfiche. Technical Report No 86, June 1975. 67 p, 18 fig, 6 tab, 35 ref, 3 append. OWRT A-020-HI(3). 14-31-0001-3511.

Descriptors: *Groundwater, *Tidal effects, Laboratories, *Aquifers, *Hawaii, *Porosity, *Water table, *Fourier analysis, Water level fluctuations, Pumping, *Analog models.
Identifiers: *Tidal fluctuations, *Coastal aquifers, Spectral analysis, Analog simulation.

A summary is presented of the work to date on the response to tides of coastal aquifers. In particular, presented are results of experiments performed to study the influence of an oscillating water table on storativity (i.e., effective porosity), the application of both harmonic and spectral analyses to water surface time histories measured in the field near Ewa Beach and in Honolulu Harbor, and an electric analog model designed to simulate the shallow, coral-limestone aquifer at Ewa Beach, Oahu, Hawaii. Results indicate that the effective porosity for an oscillating water table will in general, depend on the frequency of the oscillation with de-

pendence being strong or weak as either or both the specific yield and the transmissivity are larger or smaller, respectively. The spectral analysis confirms that the semidiurnal power suffers a greater attenuation than the diurnal power. The technique of determining aquifer properties from tidal response data is valid, but results will be less reliable than those ascertained from pump test data. The optimum results are those based on both tidal data and pump test data, as one method serves as a check on the other.
W76-04002

A REVIEW AND SYNTHESIS OF THE BIOT AND JACOB-COOPER THEORIES OF GROUND-WATER MOTION,
Nevada Univ., Reno. Desert Research Inst.
R. L. Cooley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 467, $5.00 in paper copy, $2.25 in micofiche. Center for Water Resource Research, Hydrology and Water Resources Publication, No 25, October 1975. 87 p, 5 fig, 41 ref, 2 append. OWRT A-058-NEV(1). 14-31-0001-5028.

Descriptors: *Aquifer characteristics, *Groundwater movement, Land subsidence, *Stress analysis, Uncolsolidated aquifers, Rock properties, Mechanical properties, Strain, Theoretical analysis, Flow, Porous media, Reviews, Equations.
Identifiers: Biot theory, Jacob-Cooper theory.

The Biot theory of flow in elastic media was found to be capable of describing general problems involving unsteady-state ground-water motion. Nonlinearity of the stress-strain relations, finite strain, anisotropy and heterogeneity of the porous medium, and general boundary conditions are all contained in the theory. Because the stress-strain relations were all obtained from free energy expressions, anelastic problems can be analyzed by approximations of the types often used in soil mechanics and other fields of solid mechanics. The combined fluid/solid mass continuity equation written using material coordinates has the same form as the equation in deforming coordinates derived in 1966 by Cooper. The processes of volume averaging of the fluid and solid momentum conservation equations revealed that decomposition of total stress into stress in the solids plus a fluid pressure term is obtained from consideration of the surface traction boundary condition at the fluid/solid interface. Volume averaging of the momentum conservation equations, mass conservation equations for both the fluid and the solids, and the free energy expressions also demonstrated the nature of the erros involved in the transformation from point forms to averaged forms of the equations. Future hydrogeological research involving the Biot theories and variants would profitably consider (a) determination of the conditions under which an equation of the Jacob form is a good approximation, (b) development of suitable approximation for the case where it is not and (c) formulation of field methods for obtaining the necessary parameters involved in the approximations. (Fallon-Nevada)
W76-04003

NITROGEN MOVEMENT IN A SHALLOW AQUIFER SYSTEM OF THE NORTH CAROLINA COASTAL PLAIN,
Soil Conservation Service, Raleigh, N. C.
For primary bibliographic entry see Field 5B.
W76-04099

GRAPHICAL CALCULATION OF AQUIFER TRANSMISSIVITIES IN NORTHERN CATERBURY, NEW ZEALAND,
Cantebury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
B. W. Hunt, and D. D. Wilson.
Journal of Hydrology (New Zealand), Vol 13, No 2, p 66-80, 1974. 8 fig, 7 ref.

Descriptors: *Transmissivity, *Graphical methods, *Groundwater, *Steady flow, Surface-groundwater relationships, Recharge, Aquifer testing, Specific capacity, Flow, Unconsolidated aquifers, Glacial aquifers, Graphical analysis, Aquifer characteristics, Aquifers, Aquifer systems, Water levels, Piezometry.
Identifiers: Groundwater management, *New Zealand, *Canterbury Plains(New Zealand).

A graphical technique was used to determine transmissivities and steady-state flow rates for groundwater flow in northern Canterbury. The results of the analysis appear to be in reasonable agreement with what is known about the geology and geological history of the region. Maximum well yields, obtained from drillers' records, also tend to support the final results. Hence, it was suggested that this technique might be useful as a tool in the analysis and management of groundwater aquifers in other parts of New Zealand. (Sanderson-ISWS)
W76-04102

MOVEMENT OF SOIL AND SHALLOW GROUNDWATER,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Research Management.
For primary bibliographic entry see Field 2G.
W76-04133

PROGRAM FRONT, TWO - DIMENSIONAL SIMULATION OF A MOVING INTRUSION FRONT IN A THIN HORIZONTAL CONFINED AQUIFER,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04172

PROGRAM TEBES, TRANSMISSIVITY, LEAKAGE FACTOR AND STORATIVITY FROM A LEAST SQUARES FIT OF RESIDUAL DRAWDOWN,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04181

THE EFFECT OF CLIMATE ON THE CHEMISTRY OF CARBONATE GROUNDWATER,
McGill Univ., Montreal (Quebec). Dept. of Geography.
J. J. Drake, and T. M. L. Wigley.
Water Resources Research, Vol 11, No 6, p 958-962, December 1975. 1 fig, 35 ref.

Descriptors: *Geochemistry, *Carbon dioxide, *Carbonates, *Aquifer characteristics, *Climates, *Model studies, Temperature, Chemistry, Carbonate rocks, Dolomite, Limestones, Calcite, Bicarbonates, Groundwater, Soil water, Soil chemistry, Water chemistry, Water quality, Subsurface waters, Erosion rates, North America.
Identifiers: Climatic effects, *Groundwater chemistry, Carbonate groundwater chemistry, CO2-temperature relationship, Carbonic acid.

The temperature coefficient of the log P sub CO2-temperature relationship for springwater from carbonate terrains in North American is approximately 0.07/C. Consideration of a simple model of soil air behavior and various published data suggested that the temperature coefficient of the same relationship for soil air is of the order of 0.04/C. A model where the soil zone is the source of carbon dioxide for water entering a groundwater system and where the subsequent chemical evolution of the water occurs under closed system conditions was consistent with these relationships. (Henley-ISWS)
W76-04297

REGIONAL HYDROCHEMISTRY OF NORTH AMERICAN CARBONATE TERRAINS,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 2K.
W76-04298

GROUND WATER LAW: PROBLEM AREAS,
Arizona Univ., Tucson. Coll of Law.
For primary bibliographic entry see Field 4B.
W76-04334

WATER-LEVEL RECORDS FOR COLORADO, 1971-75,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W76-04394

INTERPRETATION OF GEOLOGIC AND HYDROLOGIC DATA FROM THE RAY-1 WELL, CITY OF GALLUP, MCKINLEY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 4B.
W76-04396

POTENTIOMETRIC SURFACE AND AREAS OF ARTESIAN FLOW OF THE FLORIDIAN AQUIFER IN FLORIDA, MAY 1974,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W76-04405

COCKEYSVILLE QUADRANGLE: GEOLOGY, HYDROLOGY AND MINERAL RESOURCES,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 7C.
W76-04407

GROUND-WATER RESOURCES OF WAUKESHA COUNTY, WISCONSIN,
Geological Survey, Portland, Oreg.
J. B. Gonthier.
Wisconsin Geological and Natural History Survey, Madison, Information Circular Number 29, October 1975. 47 p, 20 fig, 1 plate, 5 tab, 34 ref.

Descriptors: *Groundwater resources, *Hydrologic data, *Water yield, *Water quality, *Wisconsin, Hydrogeology, Aquifer characteristics, Water wells, Pumping, Water utilization, Water supply, Groundwater recharge, Chemical analysis.
Identifiers: Waukesha County(Wis).

Good-quality water is available from the sand-and-gravel, Niagara, and sandstone aquifers in Waukesha County, Wis. As much as 15 gpm can be obtained from wells almost everywhere in the county. Several hundred gpm are available from aquifers in the glacial drift that fill bedrock valleys to thicknesses of 300 ft or more. Estimated well yields from much of the surficial outwash in western Waukesha County exceed 500 gpm. Estimated well yields from most of the Niagara aquifer, a dolomite as much as 325 ft thick in the eastern two-thirds of the county, exceed 50 gpm. The sandstone aquifer underlies the entire county and ranges in thickness from about 400 ft in the northwest corner to about 2,400 ft in the southeast corner. This aquifer yields more than 1,000 gpm to wells over most of the county and is the principal source for municipal and subdivision water. Groundwater in the County is suitable for most uses. Most of the water is a calcium magnesium bicarbonate type, is very hard (more than 180 mg/litre), and requires softening for some uses.

About 24.3 mgd of groundwater was pumped in the county in 1970. Sixty-two percent was withdrawn from the sandstones aquifer. More than one-half of the latter amount was for domestic use, and more than one-third was for industrial and commercial uses. (Woodard-USGS)
W76-04408

DIGITAL MODEL SIMULATION OF THE GLACIAL-OUTWASH AQUIFER AT DAYTON, OHIO.
Geological Survey, Columbus, Ohio.
R. E. Fidler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-247 997, $4.00 in paper copy, $2.25 in microfiche. Water-Resources Investigations 18-75, September 1975. 25 p, 9 fig, 12 ref. Prepared in cooperation with the Miami Conservancy District.

Descriptors: *Groundwater resources, *Model studies, *Aquifers, *Hydrogeology, *Ohio, Hydraulic properties, Water yield, Induced infiltration, Groundwater recharge, Water supply, Water demand, Evaluation, Aquifer characteristics, *Computer models.
Identifiers: Dayton(Ohio), *Great Miami River Valley(Ohio), Glacial-outwash aquifer.

Dayton, Ohio, and its environs obtain most of their water from wells which penetrate highly productive glacial-outwash deposits underlying the Great Miami River and its tributaries and receive recharge from induced leakage. Combined municipal and industrial use of groundwater in the 90 sq mi area has increased from about 180 cfs in 1960 to nearly 250 cfs in 1972. The increased pumpage has resulted in continuing water-level declines in some areas. A digital model, which uses a finite-difference approximation technique to solve partial differential equations of flow through a porous medium, was used to evaluate the effects of pumping stresses on water levels. The simulated head values presented in map form generally are in good agreement with potentiometric-surface maps prepared from field measurements. (Woodard-USGS)
W76-04409

2G. Water In Soils

SOIL WATER REPELLENCY AND THE USE OF NONIONIC SURFACTANTS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
J. Letey, J. F. Osborn, and N. Valoras.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 472, $5.00 in paper copy, $2.25 in microfiche. California Water Resources Center, Contribution 154, Completion Report, December, 1975. 85 p, 47 fig, 19 tab, 33 ref. (California Water Resources Center Project UCAL-WRC-W-332). OWRT B-141-CAL(9). 14-31-0001-3562.

Descriptors: Soil water, *Surfactants, *Wettability, *Surface tension, Penetration, *Soil water movement, *Infiltration, Adsorption, Soil profiles, *Moisture content.
Identifiers: Nonionic surfactants, *Soil water repellency.

Research was conducted (1) to determine factors causing soil water repellency, (2) to characterize and measure soil water repellency magnitude, and (3) to determine the effect of soil water repellency on various soil-water flow processes. A number of factors are involved in the formation of soil water repellency, but presence of plant litter and a soil relatively high in sand content appear to be the most important factors. High temperatures, such as those associated with fire, intensify the degree of soil water repellency. Soil water repellency can be characterized by the liquid-solid contact angle, solid-air surface tension, water drop penetration time, 90 degree surface tension, and a water repellency index. Addition of nonionic surfactants to water allows for a higher infiltration rate in a water repellent soil, but it has either negligible or negative effects when applied to a wettable soil. Application of nonionic surfactants to water repellent soils improves their rewet properties. Surfactants are adopted by soil which complicates the theoretical prediction of their effect on water infiltration. Different surfactants have different adsorption characteristics which influence theie effectiveness and mobility in a soil profile. (Snyder-Calif, Davis)
W76-04001

SOIL COMPACTION DUE TO HARVEST TRAFFIC IN SUGARCANE FIELDS ON A LAJAS VALLEY FARM OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Agricultural experiment Station.
For primary bibliographic entry see Field 3F.
W76-04089

ORIENTATION OF CLAY PARTICLES AS IT RELATES TO CRUSTING OF SOIL,
Montana Agricultural Experiment Station, Bozeman, and Montana State Univ., Bozeman. Dept. of Chemistry.
D. M. Ferry, and R. A. Olsen.
Soil Science, Vol. 120, No. 5, p 367-375, November 1975. 6 fig, 2 tab, 17 ref.

Descriptors: *Clay minerals, *Soil structure, *Montana, Soil aggregates, Soil physical properties, Organic matter, Soil compaction, Compressive strength, Turbidity, Rupturing, Shrinkage, Bulk density, Hydraulic conductivity, Permeability, Equipment, Soil strength, Electrolytes, Soil water, Model studies.
Identifiers: *Orientation, *Soil crusting, Pylon soil, Briquettes, Oxygen permeability, Thin sections, Partial pressure, Friability, Coulombic attraction.

A simple model for a soil crust was formulated and experimentally tested. It was based upon the parallel orientation and close packing of clay particles perhaps like that in shale. The physical and chemical factors which disrupt the ordered arrangement of the plate-shaped particles were noted to be those which induce aggregate formation and which result in good soil structure. The factors which induce greater orientation and packing were noted to be those which induce crust formation and poor soil structure. The resultant deleterious effects upon seedling germination, moisture penetration and runoff, aeration, and penetrability to roots are well known. Experimental attempts were made to test the validity of the proposed model. In each instance, the data either provided support for the model or else could be reasonably reconciled with the model. The model appeared to provide a reasonable basis for explaining cultural practices which are known to influence soil structure in either beneficial or deleterious ways. (Visocky-ISWS)
W76-04097

UNSATURATED FLOW MECHANISMS IN LOW-SWELLING CLAYS,
Cementation Research Ltd., Rickmansworth (England).
H. Y. Wong, and R. N. Yong.
Soil Science, Vol. 120, No. 5, p 339-348, November 1975. 5 fig, 4 tab, 15 ref.

Descriptors: *Unsaturated flow, *Clays, *Kaolinite, *Soil properties, Bulk density, Temperature, Moisture content, Wetting, Soil moisture, Laboratory tests, Saturation, Pores, Infiltration, Soil water movement, Capillary action, Statistical models, Hydraulic conductivity.
Identifiers: Low-swelling clays, Inlet suction, Wetting front, English clay, Peerless clay, Moisture profile, Intrinsic penetrability.

The unsaturated flow mechanisms in low-swelling clays were evaluated by studying the effects of dry bulk density, temperature, initial water content, and inlet suction on such unsaturated flow aspects as wetting front advance and soil moisture profile. The soil moisture profiles were plotted in a dimensionless form, and a statistical approach was adopted to give a more quantitative comparison. In general, the effects of the internal forces of interaction and hence the swelling potential were not appreciable. This was well supported by the linear relationship between wetting front advance and square root of time under practically all testing conditions, thus indicating a stable pore geometry during the flow process. In most cases a simple capillary model based upon the initial pore structure seemed to be able to explain most of the observed phenomena. However, the change in the shape of the soil moisture profiles with changes in initial water content and inlet suction still cannot be fully accounted for. (Visocky-ISWS)
W76-04098

INFILTRATION OF WATER INTO SOIL,
Commonwealth Sceintific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
P. M. Fleming, and D. E. Smiles.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 83-110. 5 fig, 90 ref.

Descriptors: *Reviews, *Infiltration, *Equations, *Model studies, Soil water movement, Porous media, Expansive soils, Soil physical properties, Computer models, Watersheds(Basins).

A basic statement of the existing physical theory of infiltration is presented in terms of a flow equation developed for uniform, non-swelling porous media, with modifications appropriate to stratifiedand swelling soils. Various empirical equations derived from hydrological studies are then interpreted in relation to this theory, with some attention to the influence of spatial variation in biological and soil properties. The implications of all these considerations for modelling infiltration in computer models of catchment processes are discussed. (See also W76-04128) (CSIRO)
W76-04132

MOVEMENT OF SOIL AND SHALLOW GROUNDWATER,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Research Management.
A. J. Peck, and M. B. Iversen.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 111-125. 1 fig, 73 ref.

Descriptors: *Reviews, *Mathematical studies, *Soil water movement, *Subsurface runoff, *Model studies, Rainfall-runoff relationships, Groundwater movement, Base flow, Surface-groundwater relationships, Water loss, Evaporation, Transpiration, Watersheds(Basins), Unsaturated flow.

After infiltration, soil water is redistributed within the soil, and lost by evaporation, transpiration and seepage. Study of these processes is complicated by severe non-linearity and hysteresis phenomena, but they can be represented mathematically and equations solved numerically to describe saturated and unsaturated flow in a relatively uniform soil. A review of such studies is presented, and the contribution of interflow and baseflow to streamflow is discussed. General aspects of the problem of the soil water phase of catchment modelling are reviewed; a major difficulty is the representatiof of spatial variation in soil properties. (See also W76-04128) (CSIRO)
W76-04133

EFFECT OF EFFLUENT FROM BEEF FEEDLOTS ON THE PHYSICAL AND CHEMICAL PROPERTIES OF SOIL,
Nebraska Univ. Lincoln Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W76-04289

EXPERIMENTAL INVESTIGATION OF THE DIFFUSIVITY COEFFICIENT,
Louvain Univ. (Belgium). Department de Genie Rural.
C. Laroussi, G. Vandervoorde, and L. DeBacker.
Soil Science, Vol 120, No 4, p 249-255, October 1975. 8 fig, 7 ref.

Descriptors: *Diffusion, *Diffusivity, *Porous media, *Moisture content, Soil physics, Unsaturated flow, Laboratory tests, Analysis, Saturation, Water, Water vapor, Mathematical studies.
Identifiers: *Two phase flow, *Diffusivity coefficient, Unsaturated soils.

The dependency of the diffusivity coefficient on the fluid content of an unsaturated porous medium was approached experimentally. The diffusivity coefficient was measured at different water contents in horizontal columns of glass beads. Analysis of the method of measurement of the diffusivity coefficient showed that simple relationships between the diffusivity coefficient and the water content were obtained within well-defined ranges of water content. The phenomena occurring in the dry range of water contents seemed basically different from those in the wet range. (Adams-ISWS)
W76-04305

SALTING THE EARTH,
Worldwatch Inst., Washington, D.C.
For primary bibliographic entry see Field 3C.
W76-04352

COLORADO REGULATIONS FOR EFFLUENT LIMITATIONS; TREATMENT WORKS SITE APPROVAL REGULATION; STORM SEWER DISCHARGE REGULATIONS.
Colorado Water Quality Control Commission, Denver.
In: 1975 BNA Environmental Rep. 726: 1141-42 (Colo. Water Qual. Control Comm'n Regs. for Effluent Limitations 1975).

Descriptors: *Sewerage, *Colorado, *Water quality standards, *Waste water disposal, *Water quality control, Permits, Suspended solids, Water pollution, Law enforcement, Chlorine, Oil, Hydrogen ion concentration, Sampling, Analytical techniques, Sewage treatment, Water treatment, Effluents, Waste water disposal.
Identifiers: *Fecal count limits.

To enhance the quality of Colorado water, the Water Quality Control Commission has promulgated standards to regulate the discharge of effluents into state waters. Apart from a few statutory exemptions, these standards are applicable to all waste water discharges. The implementing regulation does provide, however, that these standards are not immediately applicable if the discharge obtains a permit containing a schedule which will bring the discharge into compliance with the standards within a specified time. These standards are also not applicable if the Commission has otherwise promulgated specific standards for a specific industry. The standards when they are applicable, pertain to several different aspects of waste water including; BOD limits; suspended solids limits; fecal coliform count limits; residual chlorine limits; pH limits; and oil and grease limits. The regulation further specifies whether grab samples or composite samples will be used in measuring compliance, and several references are suggested to the discharger when he is devising analytical methods to assure compliance. The regulation also provides that a sewage treatment works, which is defined as a facility having a capacity to receive 2,000 gallons of discharge per day, may not be constructed unless a site approval and permit have been obtained from the Commission. (Hoffman-Florida)
W76-04375

2H. Lakes

UPTAKE AND DISTRIBUTION OF TRACE METALS IN FISH,
Purdue Univ., Lafayette, Ind. Dept. of Bionucleonics.
For primary bibliographic entry see Field 5C.
W76-04010

THE EFFECT OF THE GOSHEN BAY DIKE ON THE BENTHOS OF UTAH LAKE IN RELATION TO WATER QUALITY,
Brigham Young Univ., Provo, Utah. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W76-04013

OXIDATION OF LAKE AND IMPOUNDMENT HYPOLIMNIA,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 5C.
W76-04016

VERTICAL EDDY DIFFUSION STUDIES IN THE THERMOCLINE OF A SMALL STRATIFIED LAKE,
For primary bibliographic entry see Field 5B.
W76-04082

PHYSICAL AND CHEMICAL CHARACTERISTICS OF GREAT BEAR LAKE, NORTHWEST TERRITORIES,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
L. Johnson.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, p 1971-1987, November 1975. 7 fig, 4 tab, 67 ref.

Descriptors: *Lakes, *Physical properties, Biological properties, *Chemical properties, *Lake morphometry, *Limnology, *Dissolved oxygen, *Oligotrophy, *Canada, Water circulation, Mixing, Water chemistry, Water temperature, Bathymetry, Nutrients, Productivity, Seasonal, On-site investigations, Polar regions.
Identifiers: Great Bear Lake(Northwest Territories), Polar(Arctic) Lakes, Seasonal temperature-depth profiles, *Seasonal oxygen-depth profiles.

Great Bear Lake, a large, deep lake in a northern temperate setting, was the subject of a series of investigative sessions during the summers of 1963-1965. Sounding transects, temperature tests, and chemical analyses of water samples were performed to provide information on the limnology, biology, and bathymetry of the lake. Great Bear Lake consists of two distinct basins with a combined volume of 2235.7 cu km and a shoreline of 2719 km. The main basin waters are remarkably clear and uniform in chemistry, irrespective of location or depth. Oxygen content is near saturation level at all depths throughout the year, with supersaturation in surface waters in summer and beneath ice in winter. There is generally a single period of circulation at a temperature near 4 C in summer. Great Bear Lake thus shows the characteristics of a polar monomictic lake and is much mor oligotrophic than nearby lakes, which exhibit temperate dimictic character. This was attributed to low nutrient status and resultant low biological activity, free circulation in the main basin, and large volume of the lake. (Bender-ISWS)
W76-04095

INVENTORY OF CANADAIN FRESHWATER LAKES.
Department of the Environment, Ottawa (Ontario). Inland Waters Directories; Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 7C.
W76-04153

CANADA CENTRE FOR INLAND WATERS - 1973.
Canada Centre for Inland Waters, Burlington (Ontario).
1974, 173 p, 112 fig, 15 tab, 385 ref, 3 append.

Descriptors: *Great Lakes, *Research and development, Studies, *Projects, Beach erosion, Flooding, Properties, Damages, Hydrography, Surveys, Data storage and retrieval, Computer programs, Conferences, Oil spills, Annual, Water levels, Fisheries, *Canada.
Identifiers: *Great Lakes Water Quality Agreement, High water, Toxicity substance research, Hydraulic laboratory development.

Activities of the Canada Centre for Inland Waters, during the year 1973, are outlined. Highlights of these activities include the implementation of the Great Lakes Water Quality Agreement, the Canada-Ontario Agreement on Great Lakes water quality, efforts to curb high water on the Great Lakes and related shore erosion and property damage problems, hydrographic surveys in the Arctic, further research on environmental contaminations, oil spill studies, data aquisition systems, and research reports and conferences. (Environment Canada)
W76-04155

EFFECTS OF ICE AND SNOW COVER ON TRANSMISSION OF LIGHT IN LAKES,
Department of the Environment, Burlington (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2C.
W76-04179

MEASUREMENT OF ADENOSINE TRIPHOSPHATE (ATP) IN TWO PRECAMBRIAN SHIELD LAKES OF NORTHWESTERN ONTARIO,
For primary bibliographic entry see Field 5A.
W76-04193

GAS-EXCHANGE RATES IN A MALL LAKE AS DETERMINED BY THE RADON METHOD,
For primary bibliographic entry see Field 5B.
W76-04219

AN IN-SITU STUDY OF THE 3UTRITION OF LAKE ZOOPLANKTON USING CARBON 14 AND PHOSPHOROUS 32, FLATHEAD LAKE, MONTANA,
Montana Univ., Missoula.
For primary bibliographic entry see Field 5C.
W76-04231

PLANKTON MICRO-FOSSILS AS INDICATORS OF PALEOTROPHIC DYNAMISM IN FLATHEAD LAKE,
Montana Univ., Missoula.
For primary bibliographic entry see Field 5C.
W76-04235

CANADA CENTRE FOR INLAND WATERS, 1974.
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W76-04258

THE RESONANT INSTABILITIES OF LONG WAVES OBLIQUELY INCIDENT ON A BEACH,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W76-04300

AUSTRALIA DAMS AND STORAGES.
Department of Minerals and Energy, Canberra (Australia). Div. of National Mapping.
For primary bibliographic entry see Field 7C.
W76-04307

BIOLOGICAL AND WATER QUALITY EFFECTS OF ARTIFICIAL DESTRATIFICATION OF LAKE OF THE ARBUCKLES,
Oklahoma State Univ., Stillwater. School of Biological Sciences.
For primary bibliographic entry see Field 5C.
W76-04385

CIVIL WORKS PROJECTS: LAKESHORE MANAGEMENT.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04450

2I. Water In Plants

FOOD, FEEDING, AND CONDITION OF LOBSTERS, HOMARUS AMERICANUS, THROUGHOUT THE SEASONAL CYCLE IN BONAVISTA BAY, NEWFOUNDLAND,
Fisheries and Marine Services, St. John's (Newfoundland). Biological Station.
G. P. Ennis.
J Fish Res Board Can, 30(i2 Part 1): 1905-1909, Illus, 1973.

Descriptors: *Lobsters, *Canada, Seasonal, Bays, Crabs, *Food chains, Invertebrates, Mollusks, Fish.
Identifiers: *Bonavista Bay(Newfoundland), Hyas-araneus, Sea-stars, Strongylocentrotus-drobachiensis, *Lobster molting.

The rock crab, Cancer irroratus and spider carb, Hyas araneus, made up about 50% of the food of lobsters in Bonavista Bay, Newfoundland (Canada). The sea urchin, Strongylocentrotus drobachiensis, several species of mollusks and several species of sea stars made up 7.1, 10.9 and 10%, respectively. The remainder was mainly a variety of bottom invertebrates but fish and seaweeds were also fairly common. There was a change to a slightly more calcium-rich diet during the molting season. A rapid increase in feeding activity during the summer coincided with increasing temperatures, but despite decreasing temperatures during the fall, feeding activity remained high. The feeding index for females remained high longer into the winter than for males. Physiological condition was directly related to the molting cycle. Premolt condition was very high, postmolt very low, and recovery to the intermolt condition was attained about 2 1/2 mo. afterthe peak molting period.--Copyright 1974, Biological Abstracts, Inc.
W76-04017

THE INTERCEPTION PROCESS,
G. J. Blake.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 59-81, 3 fig, 5 tab, 39 ref.

Descriptors: *Reviews, *Interception, *Vegetation effects, *Model studies, Throughfall, Stemflow, Estimating, Measurement, Watersheds(Basins), Water balance, Evaporation, Antecedent moisture content, Rainfall intensity.
Identifiers: *New Zealand.

A review of methods and results of studies of the process of interception is presented, with emphasis on its response to meteorological and vegetative characteristics. Precipitation intensity and duration, antecedent moisture conditions, evaporative effects and characteristics of the intercepting surface (with an illustrative survey of vegetation types in New Zealand) are considered. Methods of modelling to take account of interception in conceptual studies of the catchment water balance are discussed. Some recommendations for the future direction of research are indicated. (See also W76-04128) (CSIRO)
W76-04131

VIABILITY OF ALGAE IN THE DIGESTIVE TRACTS OF TWO CYPRINODONTIDS,
Oklahoma Univ., Norman. Biological Station.
J. R. Rabe, A. A. Echelle, and H. E. Schlichting, Jr.
Prog Fish-Cult. 35(3): 147-149. 1973.

Descriptors: *Algae, Cyanophyta, Chlorophyta, Diatoms, *Killifishes, *Fish food organisms.
Identifiers: Cyprinodon-Rubrofluviatilis, *Cyprinodontids, Digestive tracts(Killifishes), Fundulus-Zebrinus.

Algae (green, bluegreen, and diatoms) occurred in 100% of the Cyprinodon rubrofluvia and Fundulus zebrinus that were examined. A total of 30 genera were cultured from the guts. There was no notable difference in floras of fore- and hindguts. Green and bluegreen algae seem to be indigestible, but evidence suggests that significant nutriment may be derived from diatoms.--Copyright 1974, Biological Abstracts, Inc.
W76-04149

DEVELOPMENT, GROWTH, AND RELATIONSHIP BETWEEN TEMPERATURE AND METAMORPHOSIS RATE OF THE EARLIER LARVAE ON MACROBRACHIUM ROSENBERGI (DE MAAN), (IN KOREAN),
Tokyo Univ. (Japan). Dept. of Fisheries.
C. S. Kwon.
Bull Korean Fish Soc. 7(2): 52-62. 1974.

Descriptors: *Growth rates, Growth stages, *Larval growth stage, Temperature, Brackish water, Rivers, *Temperature.
Identifiers: Artemia-Salina, Macrobrachium-Rosenbergi, *Metamorphosis rate, *Prawns, Indo-Pacific region.

The freshwater prawn, M. rosenbergi (De Maan) is a very common species in the Indo-Pacific region, inhabiting both fresh and brackfish waters in lowland areas. It is especially abundant in the lower reaches of rivers influenced by seawater. It is one of the largest commercial species of Macrobrachium. The larval development, growth, optimum temperature and metamorphosis rate up to the 1st post-larvae were studied under the following conditions: salinity, 6.58-7.05% Cl; pH, 8.0-8.2; rate of flow, 0.3 l/min and illumination, 3000 lux. Temperature ranged from 27.5-28.7C during early larval development. Food used for larvae was Artemia salina nauplii in filter-circulation aquaria.--Copyright 1975, Biological Abstracts, Inc.
W76-04208

WATER TRANSPORT THROUGH PLANT TISSUES IN THE PRESENCE OF A DIFFUSABLE SOLUTE,
Auburn Univ., Ala. Dept. of Civil Engineering.
F. J. Molz, and G. M. Hornberger.
Soil Sci Soc Am Proc. 37(6): Illus. 1973.

Descriptors: *Plant tissues, Solutes, Aqueous solutions, *Soil-water-plant relationships.
Identifiers: *Crank-Nicolson method, *Plant cells.

Because water transport through soils and plants are closely related and interdependent phenomena, it is logical to attempt to develop a quantitative description of water flow in the plant portion of the soil-plant-atmosphere continuum comparable to that which exists for the soil portion. The theory of nonequilibrium thermodynamics is used to develop a quantitative description of water transport through aggregations of plant cells containing both permeating and nonpermeating solutes in aqueous solution. Application of the theory results in 2 linear, coupled, partial differential equations with a water potential-related term and the diffusable solute concentration as dependent variables. As the permeability of the diffusable solute approaches zero, the system of equations reduces to a single equation first derived by Phillip, wherein the dependent variable is water potential. Using the Crank-Nicolson method, the 1 dimensional forms of the equations are solved numerically for the case of a fully turgid tissue placed in a solution of time zero. The solution shows that the resulting transport process is entirely different from the classical case in which the cell membranes are permeable to water only.--Copyright 1974, Biological Abstracts, Inc.
W76-04243

RETENTION OF FLUORESCENT PIGMENT BY COHO SALMON AFTER TWO YEARS,
Washington State Dept. of Fisheries, Olympia.
D. E. Phinney, and S. B. Mathews.
Prog Fish-Cult. Vol 35, No 3, p 161-163, 1973.

Descriptors: Salmon, *Pigments, Fluorescence, *Marking techniques, Growth stages.
Identifiers: *Coho salmon, *Fluorescent pigments.

A method of mass-marking fish that has become popular in recent years is the application of fluorescent pigment by compressed air. The longevity of the mark is not well defined, however; the longest period marked fish have been held is 6 mo. As part of a larger experiment, coho salmon (Oncorhynchus kisutch) were marked at age 0 with either red, yellow, or green pigment. After 2 yr in a relatively natural environment, marks had faded somewhat but were readily discernible. Average growth in length was about 160 mm.--Copyright 1974, Biological Abstracts, Inc.
W76-04332

VULNERABILITY OF CHANNEL CATFISH TO LARGEMOUTH BASS PREDATION,
Southern Illinois Univ., Carbondale. Fisheries Research Lab.
Jerry T. Krummrich, and Roy C. Heidinger.
Prog Fish-Cult, 35(3): 173-175, 1973, (In English).

Descriptors: *Channel catfish, *Bass, *Predation, Prey fish.

Various sizes of channel catfish (Ictalurus punctatus) were stocked in ponds containing 2-lb largemouth bass (Micropterus salmoides). Channel catfish 2-6 in. in length were vulnerable to bass predation, whereas 8-in. channel catfish were not eaten. Two-lb largemouth bass held in aquariums consumed catfish up to 7 in. in fork length.--Copyright 1974, Biological Abstracts, Inc.
W76-04401

A TECHNIQUE FOR FISH POPULATION SAMPLING IN DENSE SUBMERSED VEGETATION,
Florida State Game Fresh Water Fish Commission, Ocala.
B. S. Barnett.
Prog Fish-Cult, 35(3): 181-182, Illus, 1973.

Descriptors: *Fish populations, *Sampling, *Submerged plants, *Nets.

A technique was devised for quantitative fish population sampling in dense growths of submersed aquatic plants using a miniature modifica-

tion of the 4-sided block-off net. The net was constructed of fiberglass screen material and was designed to encompass an area of 100 sq ft. The maximum sampling depth was 3 1/2 ft. Fishes were recovered following removal of all vegetation within the sample area. This technique is not effective for large fishes which may be numerous around the periphery of dense vegetation, but it is highly effective for sampling within the plant beds which contain a large number and biomass of forage and juvenile game fishes.--Copyright 1974, Biological Abstracts, Inc.
W76-04402

2J. Erosion and Sedimentation

ANALYSIS OF THE SEDIMENT FILTERING ACTION OF GRASSED MEDIA,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 4D.
W76-04009

HYDROLOGIC DATA SUMMARY: CLEARWATER RIVER BASIN, WATER YEAR 1973-1974,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 4C.
W76-04019

HEAVY METAL POLLUTION IN THE SEDIMENTS OF THE COEUR D'ALENE RIVER DELTA,
Idaho Univ., Moscow. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W76-04091

TRANSPORT OF MATERIALS IN STREAMS,
Melbourne Univ., Parkville (Australia). Dept. of Civil Engineering.
J. D. Lawson, and I. C. O'Neill.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 165-202, 9 fig, 1 tab, 97 ref.

Descriptors: *Reviews, *Soil erosion, *Sediment transport, *Model studies, Forecasting, Sediment load, Sediment yield, Stream erosion, Alluvial channels, Channel flow, Watersheds(Basins).

The physical theory of streamflow in alluvial channels and of the transport of sediment in streams is presented and discussed, with emphasis on the prediction of sediment loads. Considerations affecting the incorporation of soil erosion and sediment transport into catchment models are outlined, and several examples of such models are described and compared. (See also W76-04128) (CSIRO)
W76-04136

SEDIMENT DATA - CANADIAN RIVERS 1971.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04251

METHOD AND APPARATUS FOR MEASURING SEWER SEDIMENTATION INFILTRATION AND FLOW,
For primary bibliographic entry see Field 5A.
W76-04275

METAL CONTENTS OF LAKE SEDIMENT CORES FROM ESTABLISHED MINING AREAS: AN INTERFACE OF EXPLORATION AND ENVIRONMENTAL GEOCHEMISTRY,
Geological Survey of Canada Ottawa, (Ontario). Resource Geophysics and Geochemistry Div.
For primary bibliographic entry see Field 5B.
W76-04291

DISPERSION OF MASS IN OPEN-CHANNEL FLOW,
Colorado State Univ., Fort Collins.
W. W. Sayre.
Hydrology Papers, No 75, August 1975. 73 p, 48 fig, 7 tab, 47 ref, 1 append.

Descriptors: *Dispersion, *Sediment transport, *Boundary processes, *Bed load, *Diffusion, Turbulence, *Open channel flow, Water pollution, Numerical analysis, Computer programs, Hydraulics, Path of pollutants.
Identifiers: Turbulent shear flow, Particulate contaminants, Aris moment transformations, Longitudinal concentration distributions.

The dispersion process for settling particles in a two-dimensional turbulent shear flow was formulated in two differential equations, one for particles suspended in the flow and the other for those deposited on the bed. Exchange of particles between the bed and the flow was permitted. Using the Aris moment transformations, the equations were converted to a more tractable system of equations which were solved by numberical methods with the aid of a digital computer, for the zero'th, first, second, and third moments of the longitudinal concentration distributions. Various combinations of boundary and other input conditions were imposed and their effects on the dispersion process were demonstrated. The results of the numerical solutions together with the results of earlier dispersion experiments with silt particles and fluorescent dyes showed that the tendency of the silt particles toward deposition and temporary storage on the bed can profoundly affect the longitudinal dispersion process. (Singh-ISWS)
W76-04311

A DISPERSION CURVE STUDY OF MODEL DREDGE SPOIL BASINS,
Texas A and M Univ., College Station. Dept. of Civil Engineering; and Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
For primary bibliographic entry see Field 5B.
W76-04321

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1970: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN, AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04392

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04393

SHORT-HEADED STREAM DELTA: MODEL FOR PENNSYLVANIAN HAYMOND FORMATION, WEST TEXAS,
Geological Survey, Denver, Colo. Coal Resources Branch.
R. M. Flores.
American Association of Petroleum Geologists Bulletin, Vol 59, No 12, p 2288-2301, December 1975. 14 fig, 17 ref.

Descriptors: *Sediment transport, *Streams, *Deltas, *Sedimentology, *Model studies, *Texas, Alluvium, Particle size, Alluvial channels.
Identifiers: *Short-headed stream delta, *Pennsylvania Haymond Formation(West Tex).

Many relatively sophisticated delta models have been developed for ancient sedimentary rocks from data available in recent sediments. Although these models have provided definitive characteristics of many deltaic deposits in the geologic record, they apply primarily to deposits of relatively large river systems. This paper develops a specific lithic model for short-headed stream-delta deposits of the Pennsylvanian Haymond Formation in the Marathon basin, West Texas. The Haymond detrital rock sequence overlying the Dimple Limestone is analogous to some modern deltas in that the coarsening upward is typical of modern prograded sequences. It consists, however, of very coarse-grained delta-plain sediments and delta-front flysch-like sand-silt couplets not common to modern deltas. Perhaps these differences can be attributed to the short-headed nature of the Haymond stream systems which formed small deltas similar to those found on the south shore of Lake Erie. (Woodard-USGS)
W76-04397

GRAPHIC AND TABULAR SUMMARIES OF WATER AND SUSPENDED-SEDIMENT DISCHARGE DURING EIGHT PERIODS OF SYNOPTIC STORM SAMPLING IN THE LOWER DRAINAGE BASIN OF REDWOOD CREEK, HUMBOLDT COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W76-04398

2K. Chemical Processes

CHEMICAL COMPOSITION OF SNOW IN THE EAST CENTRAL SIERRA NEVADA,
Max C. Fleishmann Coll. of Agriculture, Reno, Nev.
For primary bibliographic entry see Field 2C.
W76-04018

HYDROGEOLOGICAL STUDY OF THE SELKIRK AREA, MANITOBA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 4B.
W76-04162

INDUSTRIAL WATER RESOURCES OF CANADA; HUDSON BAY, LABRADOR AND ARCTIC DRAINAGE BASINS, 1959-1965,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 3E.
W76-04163

WATER QUALITY DATA, BRITISH COLUMBIA 1961 - 71.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate; Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 7C.
W76-04171

STUDY OF GROUNDWATER FLOW IN RUSSELL COUNTY, ONTARIO,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environ,ent, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W76-04237

THE EFFECT OF CLIMATE ON THE CHEMISTRY OF CARBONATE GROUNDWATER,
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 2F.
W76-04297

REGIONAL HYDROCHEMISTRY OF NORTH AMERICAN CARBONATE TERRAINS,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
R. S. Harmon, W. B. White, J. J. Drake, and J. W. Hess.
Water Resources Research, Vol 11, No 6, p 963-967, December 1975. 2 fig, 4 tab, 27 ref.

Descriptors: *Carbonates, *Water chemistry, Groundwater, *Geochemistry, *North America, Geographical regions, Carbonate rocks, Dolomite, Limestones, Carbon dioxide, Climates, Temperature, Chemistry, Bicarbonates, Hydrogen ion concentration, Calcite, Water quality, Spring waters, Ions, Hydrogeology, Variability, Water temperature, Seasonal, Saturation.
Identifiers: *Regional hydrochemistry, Carbonate terrains, Carbonate groundwater, *Groundwater chemistry, Climatic effects, Ionic strength, Calcium ion, Magnesium ion, Partial pressures.

The chemical variation of water samples drawn from carbonate terrains between southern Canada and northern Mexico was shown to be divisible into, first, variations at the local level due to (1) hydrogeologic conditions (time independent), (2) short-term fluctuations of hydrologic factors (stochastic in time), and (3) seasonal fluctuations of such factors as temperature, precipitation, and plant growth (systematic in time) and, second, regional climatic effects. These regional climatic effects can be satisfactorily represented by mean annual groundwater temperature variation. The regional variation only emerges clearly if care is taken to compare water samples from the same hydrologic class, in this case, springwater. The partial pressure of carbon dioxide with which a springwater sample is in equilibrium is well represented by log P sub CO2 = a + bT, where a is of the order of -3.5 and b is approximately 0.07 with P sub CO2 in atmospheres and T in degrees Celsius. (Henley-ISWS)
W76-04298

PRELIMINARY INVESTIGATION OF GROUND-WATER QUALITY AND ITS EFFECT ON SUBURBAN DEVELOPMENT IN WASHOE VALLEY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5A.
W76-04386

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1970: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN, AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04392

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04393

WATER-QUALITY DATA FROM OIL AND GAS WELLS IN PART OF THE PERMIAN BASIN, SOUTHEASTERN NEW MEXICO AND WESTERN TEXAS,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 7C.
W76-04395

2L. Estuaries

RESPONSE TO TIDES OF COASTAL AQUIFERS: ANALOG SIMULATION VS. FIELD OBSERVATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2F.
W76-04002

CHEMICALLY INDUCED LESIONS IN ESTUARINE OR MARINE TELEOSTS,
For primary bibliographic entry see Field 5C.
W76-04045

DEEPWATER EXCHANGES IN BUTE INLET, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Inst. of Oceanography.
C. A. Lafond, and G. L. Pickard.
Journal of the Fisheries Research Board of Canada, Vol. 32, No. 11, p 2075-2089, November 1975. 12 fig, 3 tab, 14 ref.

Descriptors: *Water circulation, *Cycles, *Currents(Water), *Density currents, *Inlets(Waterways), *Fjords, *Canada, Dissolved oxygen, Temperature, Salinity, Deep water.
Identifiers: Bute Inlet(British Columbia), Water exchange, Deepwater renewal, Deepwater inflow, Renewal processes.

Bute Inlet is a fjord of the British Columbia mainland coast connected to the Strait of Georgia through Sutil Channel. The properties of the waters in the inlet were observed during a series of cruises from June 1972 to June 1974 with the main objective of determining the water exchange below the top 100 m. Vertical longitudinal sections and time-series plots of salinity, temperature, and dissolved oxygen distributions measured during the 2-yr survey were used to analyze the circulation patterns and renewal processes of the water below 100 m. Inflows of deep water from the Strait of Georgia into Bute occurred frequently during the study period, and took place when the water from the Strait of Georgia above the inlet sill depth was denser than the water in the basin of the inlet. Volumes of some inflows into Bute were estimated, and calculations indicated that inflow speeds could be large enough to be recorded by existing current meters. The renewal of the deep water in Bute Inlet basin appears to be basically consistent with the annual cycle of deepwater replacement in the Strait of Georgia with its year-to-year variations. (Bender-ISWS)
W76-04096

STORM WAVE CLIMATES AT CAPE HATTERAS, NORTH CAROLINA: RECENT SECULAR VARIATIONS,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
B. P. Hayden.
Science, Vol 190, No 4218, p 981-983, December 5, 1975. 1 fig, 1 tab, 5 ref. ONR N00014-75-C0480, NPS CX0001-4-0096.

Descriptors: *Ocean waves, *Coasts, *Climatology, *Beach erosion, *North Carolina, Storms, Frequency, Oceans, Waves(Water), Beaches, Sands, Winds, Winter, Weather, Climates, Meteorology.
Identifiers: *Cape Hatteras(NC), *Mid-Atlantic coast.

Mid-Atlantic coastal wave climates have undergone significant change within the last three decades. The duration and frequency of storms generating high waves and the length of the winter storm wave season have increased. These changes may, in part, account for the observed trend in shoreline erosion along the east coast of the United States. (Sims-ISWS)
W76-04101

SOME COMPONENTS OF AN ECOSYSTEM MODEL OF WESTERNPORT BAY,
Melbourne Univ., Parkville (Australia). Centre for Environmental Studies.
For primary bibliographic entry see Field 5B.
W76-04148

REPORT FOR THE FISCAL YEAR 1972 - 1973: STUDY OF THE ST. LAWRENCE RIVER.
St. Lawrence River Working Group, Quebec.
For primary bibliographic entry see Field 4A.
W76-04166

THE RESONANT INSTABILITIES OF LONG WAVES OBLIQUELY INCIDENT ON A BEACH,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
R. T. Guza, and A. J. Bowen.
Journal of Geophysical Research, Vol 80, No 33, p 4529-4534, November 20, 1975. 5 fig, 2 tab, 21 ref.

Descriptors: *Waves(Water), *Beaches, Resonance, Fluid mechanics, Wavelengths, Oceanography, Theoretical analysis, Estuaries, Ocean waves, Oceans, Gulfs, Energy.
Identifiers: *Long waves, *Resonant instability, Edge waves, Incident waves, Beach cusps, Wave trains.

A monochromatic unidirectional wave train, incident on a plant beach and strongly reflected there, was shown to transfer energy to edge waves of lower frequency through a weak nonlinear interaction. For any angle of wave incidence the most readily excited edge wave perturbation consists of two low-mode progressive edge waves, generally having different frequencies and wave numbers, traveling in opposite directions along the beach. Standing edge waves, which might form stationary morphologic features with a regular longshore rhythm, are theoretically only excited when the primary surface waves are normally incident. However, edge waves generated by almost normally incident primary waves may be linked to features which slowly migrate along shore. On beaches bounded by headlands or jetties the progressive edge waves excited would be reflected at both ends, forming a complex pattern of standing waves. For beaches bounded at one end, only one of the edge waves would be standing. Regular beach cusps would therefore be expected in the vicinity of barriers. These cusps should decrease in relief with increasing distance from the obstacle as the reflected edge wave, which is not being actively forced, dies away due to viscous dissipation and further nonlinear interactions. Intriguingly, the cusps should have slightly different wavelengths on either side of the obstacle. (Lee-ISWS)
W76-04300

DIRECTIONAL WAVE SPECTRA FROM DAYLIGHT SCATTERING,
Raytheon Co., Wayland, Mass. Advanced Development Lab.
R. S. Kasevich.
Journal of Geophysical Research, Vol 80, No 33, p 4535-4541, November 20, 1975. 9 fig, 13 ref.

Descriptors: *Ocean waves, *Waves(Water), *Remote sensing, Photography, Aerial photography, Light, Optical properties, Reflectance, Gravity waves, Oceans, Fourier analysis, Oceanography.
Identifiers: *Daylight scattering.

A first-order analysis of the skylight scattered from the sea surface for understanding the mechanism of transfer of wave profile to photographic image has been given in an earlier paper. The analysis was extended to second order and numerically evaluated for clear blue and uniform overcast skies. The theoretical results indicated experimental conditions required to obtain a photographic transparency with optical transmittance linearly proportional to sea wave profile.

Experimental parameters included sun angle, camera orientation, and maximum wave slope. Fourier analysis of the transparency by coherent optical processing methods gives the directional power density spectrum of the wave field. (Sims-ISWS)
W76-04301

THE FLOW OF A TWO-LAYER FLUID OVER TOPOGRAY IN A POLAR OCEAN,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
Journal of Physical Oceanography, Vol 5, No 4, p 615-524, October 1975. 10 fig, 9 ref. NSF DES 74-14356.

Descriptors: *Model studies, *Ocean currents, *Oceans, *Polar regions, Mathematical models, Fluid mechanics, Flow, Topography, Cold regions, Coriolis force, Ocean circulation, Oceanography.

A two-layer model was constructed for wind-driven flow over topography in a closed polar basin where the variation of Coriolis force with latitude is negligible. The model equations were reduced using scales appropriate for the Arctic Ocean. The nonlinear equations governing the geostrophic flow in the two layers could, for a basins with strong topography, be reduced to a linear differential equation. This was solved for a 'model' topography which mimics the bathymetry of the Canadian Basin. The asymmetry or intensification in the surface water was described as a function of the non-dimensional parameters which contain information on the basic stratification, rotation, and vertical mixing. (Sims-ISWS)
W76-04304

A GENERALIZED TENSOR FORMULATION OF ATMOSPHERE AND SEAS DYNAMICS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 2A.
W76-04317

ESTUARY STUDIES,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs.
For primary bibliographic entry see Field 5B.
W76-04319

THE FEDERAL RULE OF ACCRETION AND CALIFORNIA COASTAL PROTECTION,
For primary bibliographic entry see Field 6E.
W76-04338

SEABED AND SUBSOIL - FEDERAL V STATE CONTROL IN U.S. (DISCUSSION OF UNITED STATES V MAINE).
For primary bibliographic entry see Field 6E.
W76-04344

THE CALIFORNIA COASTAL ZONE CONSERVATION ACT OF 1972 (PROPOSITION 20) AND COMPARABLE LAND USE LIMITATIONS AFFECTING THE MINERAL INDUSTRY IN OTHER STATES,
Chaplin Petroleum Co., Forth Worth, Tex.
For primary bibliographic entry see Field 6E.
W76-04345

THE MISSISSIPPI PUBLIC TRUST DOCTRINE: PUBLIC AND PRIVATE RIGHTS IN THE COASTAL ZONE,
For primary bibliographic entry see Field 6E.
W76-04348

THE USE AND LEGAL SIGNIFICANCE OF THE MEAN HIGH WATER LINE IN COASTAL BOUNDARY MAPPING,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-04355

STATE COASTAL ZONE MANAGEMENT PROGRAM.
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04446

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

COUNTERCURRENT FLOW OSMOTIC PROCESSES FOR THE PRODUCTION OF SOLUTIONS HAVING A HIGH OSMOTIC PRESSURE,
University of the Negev, Beersheba (Israel). Research and Development Authority.
S. Loeb, and M. R. Bloch.
Desalination, Vol 13, No 2, p 207-215, October, 1973. 6 fig, 1 ref.

Descriptors: *Desalination, *Membrane processes, *Reverse osmosis, Flow, Osmotic pressure, Water treatment, Waste water treatment.
Identifiers: Osmotic processes, Countercurrent flow.

Several osmotic processes (concentrate return reverse osmosis, osmotic sink reverse osmosis, and osmotic sink osmosis) may be used to produce or further concentrate solutions having high osmotic pressures. These processes all involve countercurrent flow, on opposite sides of a semipermeable membrane, of the permeant donating (concentrating) solution and the permeant receiving (diluting) solution. The processes depend on the fact that, at any point in the train of membranes, the permeant receiving solution has a higher osmotic pressure than the permeant. This effect is achieved by the injection of a solution having a high osmotic pressure at the beginning of the permeant receiving side of the countercurrent system. (Murphy-FIRL)
W76-04185

APPLIED RESEARCH FOR RO AND UF,
Lund Univ. (Sweden). Food Engineering Div.
For primary bibliographic entry see Field 5D.
W76-04217

TREATMENT OF SEA WATER PRODUCES HIGH-QUALITY REACTOR COOLANT,
Southern California Edison Co., Los Angeles, Calif.
M. K. Sullivan.
Power Engineering, Vol 80, No 1, p 44-47, January 1976. 3 fig.

Descriptors: Water quality control, Water purification, *Water treatment, Water pollution control, Nuclear powerplants, Sea water, *Evaporation, *Desalination, Demineralization, Cooling water, *Ion exchange, Resins, *Cation exchange, *Anion exchange, Waste disposal, Radioactive waste disposal, California.
Identifiers: Lithium-7 resin, Radwaste deionizers, San Onofre(Calif).

San Onofre, a nuclear generating station in Southern California, needs a reliable supply of thousands of gallons of high-quality cooling water. Flash evaporators produce a total of 100 gpm of high-quality water from the Pacific Ocean. Reactor coolant quality is maintained through a bypass chemical and volume control system. The coolant passes through parallel mixed bed deionizers consisting of a strongly acidic cation exchange resins in the lithium-7 form and a strongly basic anion exchanger in the hydroxide form to remove activated products of corrosion and erosion. Some means of lithium removal must be incorporated in the system. This is accomplished by a hydrogen-form cation exchange unit which is also useful to remove cesium and cobalt during clean-up operations. A ceramic filter removes particulate matter from effluent flowing from the demineralizers. The system also contains mean to add other chemicals as necessary. The radioactive waste system removes and concentrates gas and liquid wastes throughout the plant. Borated reactor coolant first enters a flash tank. Vapor from the flash tank is collected and stored in waste gas decay tanks before processing in a cryogenic purification system and disposal up the stack. After flashing, contaminated coolant is pumped to liquid waste holding tanks. Then it passes in series through liquid waste ion exchangers. If minimum release specifications are met it is discharged through a new ion exchanger and gas stripper and passes to a circulating water outfall where it is diluted with condenser water and discharged to the sea. If contents do not meet release requirements it is processed through a new ion exchanger consisting of four mixed-bed units. (Sinha-OEIS)
W76-04262

PROCESS FOR PRETREATING SEA WATER BY PREHEATING SAME IN THE PREPARATION OF BRINE AND FRESH WATER,
H. Tabata, and N. Tabata.
US Patent No 3,923,607, 3 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 301, December 2, 1975.

Descriptors: *Patents, *Desalination, *Desalination processes, *Separation techniques, Water treatment, Water purification, Sea water, *Flash distillation, Calcium, Sodium chloride.
Identifiers: Heat exchange, *Pre-treatment(Sea water).

In a method for preparing brine and fresh water from sea water by heating the sea water in a multiple effect multi-stage flash evaporator., the sea water first enters the final heat rejection stages of the flash evaporator and is passed in indirect heat exchange with vapor from the flashing sea water in the heat rejection stages to condense the vapor and preheat the sea water. The sea water is treated with magnesium carbonate to remove calcium and is deaerated at a pH of 5.0 to 5.5. The sea water is introduced to the terminal flash stage of the first effect of the evaporator to be further flash evaporated. The entering sea water is additionally preheated to about 50 deg to 65 deg C in a separate preheating stage prior to being subjected to the calcium removal and deaeration steps where after deaeration, the temperature of the thus treated sea water is about the same as it is in the terminal flash stage. (Sinha-OEIS)
W76-04277

MAGNETIC APPARATUS FOR TREATING LIQUIDS CONTAINING CALCAREOUS MATTER,
For primary bibliographic entry see Field 5D.
W76-04283

REVERSE OSMOSIS APPARATUS,
United Kingdom Atomic Energy Authority, London (England). (Assignee).
J. R. Grover, R. Gayler, and M. H. Delve.
U.S. Patent No 3,923,664, 4 p, 6 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 319, December 2, 1975.

Descriptors: *Patents, *Reverse osmosis, *Waste water treatment, Water quality control, *Membrane processes, Separation techniques, *Desalination, Equipment, Saline water.

A reverse osmosis apparatus comprises a pressure shell, a feed solution inlet, a feed solution outlet, a product outlet, a membrane assembly within the pressure shell, and shell partition means for directing feed solution over parts of the assembly in a sequential manner. The shell partition means reduces the cross-sectional area of the feed solution flow path and allows a smaller capacity pump to be used so as to yeild a higher product water recovery from a lower capacity plant. The invention also allows the pressure shell to be of right-circular cylindrical form and the shell partition means to be arranged so that the feed solution inlet and feed solution outlet are placed at the same end of the pressure shell and the product outlet may be at the other end of the pressure shell. This arrangement allows ease of replacement of rod bundles which use large numbers of rods. (Sinha-OEIS)
W76-04286

3B. Water Yield Improvement

GEOTHERMAL WATER RESOURCES IN ARIZONA: FEASIBILITY STUDY,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 4B.
W76-04005

EFFICIENT RESERVOIR DESIGN FOR PLAYAS OF THE SOUTHERN HIGH PLAINS,
Southwestern Great Plains Research Center, Bushland, Tex.
A. D. Schneider.
Transactions of the American Society of Agricultural Engineers, Vol 18, No 5, p 892-896, September-October 1975. 5 fig, 3 tab, 11 ref.

Descriptors: *Playas, *Reservoir design, *Dikes, *Storage, *Optimization, Diversion, Design data, Excavation, Mathematics, Runoff, Reservoirs, Water storage, *Great Plains.
Identifiers: *Southern High Plains, Playa modification.

Evaporation losses from the shallow playas of the Southern High Plains can be reduced by storing the water in deep reservoirs with small surface areas. The reservoir storage is obtained most economically by construction a dike through the playa and diverting all runoff into the diked reservoir. For equal dike heights and reservoir areas, an efficient reservoir is obtained by maximizing the ratio of the reservoir area to the dike length. Optimality mathematics was used to maximize this ratio for sector, parabolic and circular arc dikes within a flat-bottomed, circular playa. The maximum ratios for the three dike shapes were nearly equal; the sector dike reservoir was selected for field application because of its simplicity. Design data were developed for sector dike reservoirs covering from one-tenth to one-half of the playa bottom. The water stored per unit of earth excavated was much higher than for earlier playa modification models. (Singh-ISWS)
W76-04296

3C. Use Of Water Of Impaired Quality

EVALUATION OF AGRICULTURAL ADJUSTMENT TO IRRIGATION WATER SALINITY: A CASE STUDY FOR PINAL COUNTY, ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
W. E. Martin, and M. A. Boster.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 474, $4.00 in paper copy, $2.25 in microfiche. Completion Report, November 1975. 27 p, 7 fig, 1 tab, 17 ref. OWRT A-048-ARIZ(2). 14-31-0001-4003.

Descriptors: *Salinity, *Linear programming, Irrigation, *Water quality, *Arizona, Irrigation water, Colorado River, *Imported water, *Mathematical models.
Identifiers: Agricultural adjustment, *Irrigation water quality, Central Arizona project.

Upon completion of the Central Arizona Project (CAP), Colorado River water will be delivered to Pinal County for agricultural use. Any new importation of water to an area implies adjustments in the organization of the economy of the area. For irrigated agriculture, adjustments will occur in input mix, output mix; acreage farmed, and in gross and net incomes. A complicating factor associated with importation of Colorado River water is that the imported water will contain different dissolved salt concentrations than the groundwater and surface water currently being used. Mathematical programming models of representative irrigated farms in Pinal County are used to project adjustments implied under several assumptions as to the availability, cost and salinity of the various sources of irrigation water. It is found that (1) most monetary benefits of the Project will be captured by the Indian farmers of the county, (2) groundwater conservation will be minimal unless farmers are forced to purchase large quantities of CAP water, (3) provision of CAP water will not affect cotton acreage but will significantly increase the acreage of small grains and alfalfa, (4) the possibility of increased salinity from CAP water should not be of concern to farmers in the county since projected decreases in net income occurring because of increased salinity average only 61 cents per acre per year, and (5) increased income to non-Indian farmers resulting from provision of CAP water at thecurrently proposed price will not be sufficient to pay the additional fixed costs for distribution systems.
W76-04004

IRRIGATION RETURN FLOW, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5B.
W76-04230

HEAVY METALS IN AGRICULTURAL LANDS RECEIVING CHEMICAL SEWAGE SLUDGES, VOLUME II,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W76-04244

LAND DISPOSAL OF SEWAGE SLUDGE, VOLUME II, (APRIL, 1973-MARCH, 1974).
Guelph Univ. (Ontario). Dept. of Land Resource Science; and Guelph Univ. (Ontario). Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W76-04247

IRON-INDUCED ORANGING DISEASE OF RICE IN RELATION TO PHYSICOCHEMICAL CHANGES IN A FLOODED OXISOL,
Centro Internacional de Agricultura Tropical, Bogota (Colombia).
For primary bibliographic entry see Field 5C.
W76-04339

SALTING THE EARTH,
Worldwatch Inst., Washington, D.C.
E. P. Eckholm.
Environment, Vol. 17, No. 7, p 9-15 (1975). 7 p, 5 photo, 23 ref.

Descriptors: *Saline soils, *Soil contamination, *Irrigation systems, *Irrigation efficiency, *Silting, *Saline water intrusion, Saline water, Freshwater, Soils, Soil contamination effects, Irrigation practices, Irrigation water, Reservoirs, Water table, Groundwater, Water quality, Irrigation effects, Agronomic crops, Crop response, Crops, Crop production, Sedimentation, Encroahment.
Identifiers: *Siltation.

The efficiency of irrigation works, a subject of vital concern in ensuring adequate food supplies, is being seriously threatened. Soil salinity, a problem often associated with poor irrigation management, is significantly undermining the productivity of a large portion of the world's irrigated lands. At the same time, large silt loads caused by the erosion of soils are clogging many reservoirs and waterways. Salinization is caused by a natural process which increases the salt concentration in the water not used by plants. Because of this process, getting rid of excess irrigation water is critical; otherwise, the excess waters may percolate down to the underground water table. In the absence of any drainage, the water table may then rise to the root zone, where its brackishness stunts or prohibits crop growth. In addition to salinization, irrigation works are subject to damage from siltation. In a number of examples, this article shows how a dam's reservoir capacity may be seriously reduced because dambuilders underestimated the threat of siltation. (Hoffman-Florida)
W76-04352

3D. Conservation In Domestic and Municipal Use

SPECIAL CHARACTERISTICS OF URBAN HYDROLOGY,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Progeam.
For primary bibliographic entry see Field 2A.
W76-04138

CATCHMENT MODELS FOR URBAN AREAS,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 2A.
W76-04139

STATISTICAL ESTIMATION OF A DEMAND FUNCTION FOR RESIDENTIAL WATER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 6D.
W76-04236

MODELS FOR MUNICIPAL AND INDUSTRIAL WATER DEMAND FORECASTING IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 6D.
W76-04390

3E. Conservation In Industry

GEOTHERMAL WATER RESOURCES IN ARIZONA: FEASIBILITY STUDY,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 4B.
W76-04005

COMPLETE RECOVERY OF ITALIAN IN-PLANT WASTE WATERS,
Smogless Italiana Spa, Milan (Italy).
For primary bibliographic entry see Field 5D.
W76-04053

RECOVERY OF FELDSPAR AND GLASS SAND FROM GEORGIA WASTE GRANITE FINES,
Bureau of Mines, Tuscaloosa, Ala. Tuscaloosa Metallurgy Research Lab.
For primary bibliographic entry see Field 5D.
W76-04073

PULP MILL GETS ITS OWN OXYGEN GENERATOR.
For primary bibliographic entry see Field 5D.
W76-04076

RECYCLING AND RECLAMATION--FACT OR LIP SERVICE.
For primary bibliographic entry see Field 5D.
W76-04084

RECYCLING OF WASTE IN THE MEAT INDUSTRY,
Hellaby Shortlant Ltd. Auckland, New Zealand.
For primary bibliographic entry see Field 5D.
W76-04088

INDUSTRIAL WATER RESOURCES OF CANADA; HUDSON BAY, LABRADOR AND ARCTIC DRAINAGE BASINS, 1959-1965,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
J. F. J. Thomas, and R. M. Gale.
Water Survey Report No 15, 1973. 147 p, 4 fig, 6 tab, 3 append.

Descriptors: *Chemical analysis, *Municipal water, *Water quality, Water resources, Surface waters, Water supply, Geology, Hardness(Water), Mineralogy, Population, Surveys, Water treatment, Analytical techniques, *Canada.
Identifiers: *Hudson Bay, *Arctic drainage basin, *Labrador drainage basin.

This is the final part of the series of Water Survey Reports of the industrial water resources of Canada and deals with the Hudson's Bay, Labrador, and Arctic drainage basins. Chemical analyses of water from 216 stations are recorded, with descriptions of 49 municipal and 17 other water supplies. Records between 1947 and 1961 are included. The geology of the drainage basins, the procedures used and the analytical techniques employed are summarized briefly. The waters vary widely in hardness; mineral content is mainly alkaline earth bicarbonates; alkalies, sulphates and chloride are low. (Environment Canada)
W76-04163

EXPERIMENTAL BURNING OF WASTE OIL AS A FUEL IN CEMENT MANUFACTURE,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5A.
W76-04177

CHEMICAL RECOVERY PLANT IS FINAL STAGE OF $9.2 MILLION WASTE PROGRAM,
For primary bibliographic entry see Field 5D.
W76-04195

NEW YORK FIRM BUYS CHEMICAL WASTES FOR RECYCLING.
For primary bibliographic entry see Field 5D.
W76-04196

WASTE WATER RECYCLING PROCESS,
For primary bibliographic entry see Field 5D.
W76-04203

CONTINUOUS ION EXCHANGE IN FLUIDIZED BEDS,
Bradford University, Yorks, United Kingdom, Schools of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W76-04212

THE CLOSE CIRCUIT OF INDUSTRIAL WASTE WATERS (DER GESCHLOSSENE KREISLAUF BEI INDUSTREABWASSERN),
For primary bibliographic entry see Field 5D.
W76-04215

PROTEIN RECOVERY FROM DAIRY WASTES BY ELECTROFLOTATION,
For primary bibliographic entry see Field 5D.
W76-04216

WATER RECYCLING IN THE PULP AND PAPER INDUSTRY,
Buckeye Cellulose Corp., Memphis Tenn.
For primary bibliographic entry see Field 5D.
W76-04222

FIBER RECOVERY INCREASES WATER REUSE AND REDUCES WASTE TREATMENT COSTS,
Dorr-Oliver, Inc., Stamford, Conn.
For primary bibliographic entry see Field 5D.
W76-04224

CLOSED LOOP WATER-SYSTEMS AT RED RIVER VALLEY FACTORY,
Red River Valley Cooperative, Hillsboro, N. Dak.
For primary bibliographic entry see Field 5D.
W76-04225

CLOSED-LOOP FILTRATION SYSTEMS HELP MIDWEST SUGAR BEET PLANT MAINTAIN HIGH WATER QUALITY,
River River Valley Cooperative, Hillsboro, N. Dak.
For primary bibliographic entry see Field 5D.
W76-04226

WATER TRANSPORT OF WOOD: THE CURRENT SITUATION,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5G.
W76-04261

TREATMENT OF SEA WATER PRODUCES HIGH-QUALITY REACTOR COOLANT,
Southern California Edison Co., Los Angeles, Calif.
For primary bibliographic entry see Field 3A.
W76-04262

APPARATUS FOR PROCESSING FLUSHING LIQUOR FROM A GAS MAIN OF COKE OVENS,
Otto (C.) and Co., G.m.b.H., Bochum (West Germany). (Assignee).
For primary bibliographic entry see Field 5D.
W76-04282

LEGAL PROBLEMS INVOLVED IN DEVELOPING WATER SUPPLIES FOR ENERGY DEVELOPMENT,
Debevoise and Liberman, Washington, D.C.
J. C. Muys.
Natural Resources Lawyer, Vol 8, No 2, p 335-46 (1975). 12 p.

Descriptors: *Hydroelectric power, *Federal government, *Water rights, *Energy, *Diversion, Coals, Oil, Gases, Slurries, Cooling, Jurisdiction, Beneficial use, Reclamation, Hydroelectric project licensing, Navigable waters, Grants, Management, Water surplus, Eminent domain, Streams, Federal Reclamation Law, Federal Power Act(FPA).
Identifiers: *Federal-interstate compact, Coal slurry pipelines, Licenses.

One aspect of the legal system for obtaining water rights in the West is the body of jurisprudence relating to Indian water rights. Another is that providing for acquisition of water rights for various beneficial uses. Water rights may also be acquired by contract from federal projects, while non-federal water resources development projects involving hydroelectric generation must be licensed by the Federal Power Commission (FPC). The relationships among these various systems is less than clear, especially since the federal common law of interstate water compacts must also be considered in evaluating the availability of a water supply for an energy development project. In this regard, specific areas are analyzed relating to National Environmental Policy Act requirements, and to litigation involving the authority of the FPC to license stream electric generating plants, coal slurry pipelines, and hydroelectric project licensing. The conclusion drawn is that the problems presented can best be dealt with on a regional basis through the institutional device of the federal-interstate compact. (Segall-Florida)
W76-04336

MODELS FOR MUNICIPAL AND INDUSTRIAL WATER DEMAND FORECASTING IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 6D.
W76-04390

MINERAL AND WATER RESOURCES OF SOUTH DAKOTA.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4A.
W76-04400

3F. Conservation In Agriculture

EVALUATION OF AGRICULTURAL ADJUSTMENT TO IRRIGATION WATER SALINITY: A CASE STUDY FOR PINAL COUNTY, ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3C.
W76-04004

SOIL COMPACTION DUE TO HARVEST TRAFFIC IN SUGARCANE FIELDS ON A LAJAS VALLEY FARM OF PUERTO RICO,
Puerto Rico Univ., Mayaguez. Agricultural experiment Station.
L. N. Shukla.
The Journal of Agriculture of the University of Puerto Rico, Vol. 58, No. 3, p 279-292, July, 1974. 14 fig.

Descriptors: *Agriculture, *Agronomy, *Soil compaction, Soil moisture meters, Soil moisture, Food and cover crops, *Puerto Rico, Sugarcane.
Identifiers: Agricultural machinery, *Sugarcane harvesting.

Large and heavy machinery has recently been introduced on Puerto Rico for the harvesting, loading, and transporting of sugarcane. These machines have increased the soil compaction, and tests were conducted on a farm in the Lajas Valley of Puerto Rico to determine the effects of different types of machinery on the soil. The degree of compaction caused in the center of furrows by a J and L harvester and in the banks of ridges by

loaded transport carts was measured. The extent of soil compaction was determined by taking penetrometer readings before and after the vehicles had passed over the area. Soil moisture was measured by the oven-dry method. It was concluded that the harvester did not cause severe soil compaction but that the loaded transport carts caused considerable compaction in the banks of the ridges. (Orr-FIRL)
W76-04089

AUTOMATIC APPARATUS FOR IRRIGATION, WITH TIMER,
F. Roveda.
U.S. Patent No. 3,921,904, 4 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1836, November 25, 1975.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Water distribution(Applied), Distribution systesm, Sprinkler irrigation, Application equipment, *Timing, *Automatic control.

An apparatus for watering pot-plants, flowerbeds or gardens, at pre-established intervals, and for pre-established periods of time is described. The apparatus is suitable for spreading and nebulizing the irrigating water jet. The apparatus achievs its objectives by means of a timer disc which is continuously moved by a small electric motor and which has housings for cams, on which can be placed cams of different dimensions, suitable for controlling, by means of a lever device, the closing of an electric circuit which controls the flow of irrigating water. In addition to this device there is a diffusing device, to be placed in the ground tp be watered, and which consists of a spraying nozzle and a plate opposite to it. (Sinha, OEIS)
W76-04265

SOIL IRRIGATION METHODS AND APPARATUS,
Hawaiian Sugar Planters Association Experiment Station, Honolulu. (Assignee)
B. A. McElhoe, and J. G. Tabrah.
US Patent No 3,921,905, 6 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1836, November 25, 1975.

Descriptors: *Patents, *Irrigation, *Irrigation systems, Irrigation practices, Water delivery, Water distribution(Applied), Irrigation efficiency, Flow control.
Identifiers: *Drip irrigation, Flushing, Drip tubes.

A soil irrigating system includes drip tubes connecting with a supply of pressurized water to dispense a substantially continuous flow of water to the soil. Flushing valves are connected to remote ends of the drip tubes to periodically flush the tubes clean. Each flushing valve comprises an inlet connecting with a drip tube, an outlet for discharging water from the drip tube, a pilot opening arranged to introduce pressurized pilot water to the valve, and a valve element of resiliently deformable material. The valve element has a recessed configuration suitable for enabling the valve element to extend longitudinally forward and radially outward into a sealing posture in response to urgings of pressurized pilot water at the pilot opening, to prevent discharge of water from the remote end of the associated drip tube. When water pressure at the pilot opening is relieved, water pressure from the drip tube shifts the valve element to an open position to enable water to be flushed from the drip tubes. A valved manifold is provided to conduct pressurized liquid to the pilot openings to simultaneously shift the valve elements to their closed positions to prevent flushing of the drip tubes. The valve manifold is also able to relieve liquid pressure at the pilot openings so that the valve elements are simultaneously shifted to their open position by water pressure from the drip tubes, to permit flushing of the drip tubes. (Sinha-OEIS)
W76-04266

CORNER IRRIGATION MACHINE,
Lindsay Mfg Co., Nebr. (Assignee)
A. L. Zimmerer.
US Patent No 3,921,908, 3 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1837, November 25, 1975.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation design, *Irrigation practices, Irrigation efficiency, Water utilization, Water distribution(Applied).
Identifiers: *Center pivot irrigation system.

In a center pivot irrigation system, the mechanism described provides for irrigating or watering the corner of a generally square field which the circular pattern of a conventional center pivot system cannot otherwise reach. To irrigate the corners a boom mechanism is mounted on and supported by the outermost tower and is constructed to extend beyond it by a substantial distance. A pipeline is connected to the boom in a conventional manner and the system pivots clockwise. When the end of the rig is opposite a side of the field, the boom may be folded back to a position more or less tangent to the circle. Then the boom will not extend out over the edge of the field and possibly interfer with a fence, trees or roads. As the system moves to a position opposite the corner, a control mechanism may energize the drive and cause the boom to pivot out to its fully extended position. Thus the boom may be in its fully extended position for some 10 to 20 deg of system rotation. (Sinha-OEIS)
W76-04267

POP-UP SPRINKLER WITH MULTIPLE-PURPOSE ONE-PIECE SEAL,
Nelson (L. R.) Corp., Peoria, Ill. (Assignee)
J. R. Hayes, and K. J. Bruninga.
US Patent No 3,921,910, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1838, November 25, 1975.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation systems, *Irrigation practices, Irrigation efficiency, Irrigation operation and maintenance, Water control, Sealants, Leakage.
Identifiers: *Pop-up sprinklers.

A pop-up sprinkler has a multiple-purpose one-piece annular seal which performs specific functions. It provides a static seal between the separable parts of the sprinkler housing assembly. It provides a spring seat for one end of the retracting coil spring. It provides a pressure responsive leakage path between the fixed housing assembly and movalbe sprinkler head assembly for passage of water. When the water source is innitially started it removes contiguous debris and prevents passage of debris downward through the housing during the extending movement of the sprinkler head assembly. The seal also provides an operative static seal between the fixed housing assembly and the sprinkler head assembly when the latter is in its operative extended position. Finally the seal provides a wiping and centering action on the sprinkler head assembly during the retracting movement. (Sinha-OEIS)
W76-04268

MOBILE IRRIGATION SYSTEM,
Shur-Rane Corp., San Jose, Calif. (Assignee)
J. A. Mortimer.
US Patent No 3,923,249, 3 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 190, December 2, 1975.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation efficiency, Irrigation operation and maintenance, Irrigation practices, Pipes.
Identifiers: Mobile irrigation system.

An improved, mobile irrigating system has a plurality of wheel-mounted irrigating pipes coupled in line to a central, internal combustion engine powered unit which turns the irrigating pipe wheels by turning the line of coupled pipes. The improvement comprises a sealed, hollow cross support structure for the central power unit, the hollow space of the cross support constituting a fuel tank for the engine, and indicator means mounted on selected ones of the wheels and aligned with each other to indicate the rotational orientations of the pipes about their longitudinal axes. A hollow, T-shaped pipe is mounted within the hollow cross support and a hollow fitting passes into the hollow of the cross support and is sealed to the midpoint of the T-shaped pipe to establish fluid communication. The filling is connected by a pipe to the engine and the distal ends of the T-shaped pipe are positioned within the ends of the hollow cross support. Check valve means are mounted within the distal ends of the T-shaped pipe so that fuel within the hollow cross support may be sucked through the T-shaped pipe by the engine regardless of the attitude of the cross support with respect to gravitational forces which micht cause the fuel within the ccross support to accumulate at one end. (Sinha-OEIS)
W76-04276

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

DEVELOPMENT PRIORITIES IN THE WEST RIVER REGION, NORTH DAKOTA, A SOCIAL ATTITUDE AND COMMUNICATION ANALYSIS,
North Dakota Univ., Grand Forks. Communication Research Center.
For primary bibliographic entry see Field 6B.
W76-04007

DERIVATION AND EVALUATION OF RESERVOIR RULE CURVES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
B. A. Newman, and D. P. Loucks.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 498, $5.00 in paper copy, $2.25 in microfiche. Cornell University Water Resources and Marine Sciences Center Technical Completion Report, December 1975. 73 p, 6 fig, 9 tab, 12 ref, 2 append. OWRT A-051-NY(1). 14-31-0001-5032.

Descriptors: *Reservoir operation, *Reservoir yield, Reservoir storage, *Project planning, *Optimum development plans, Linear programming, *Optimization, Systems analysis, Simulation analysis, Model studies, *Multiple-purpose reservoirs, Computer models.
Identifiers: *Rule curves.

A deterministic preliminary screening model for planning multiple-purpose multiple-reservoir river basin projects is presented. The model, based on linear programming, both optimizes engineering parameters and provides sufficient information to define explicitly reservoir operating policies (rule curves). The effectiveness of this modeling technique for defining both reservoir capacities and reservoir operating policies that provide streamflows of the desired quantities and reliabilities is demonstrated by using the model to solve a multiple-reservoir example problem based on actual streamflow data. The linear programming model defines explicitly both the rule curves and the cost effective capacity of each reservoir entering the solution of the example problem. A policy not explicitly defined by the model is chosen by the modeler for coordinating the operation of the multiple-reservoir system; the performance of this system is then tested using a simulation model

based on the historical streamflow data. The results of this simulation show that the solution to the example problem produces the desired streamflows with remarkable accuracy. A significant advantage of this methodology for preliminary screening of alternative river basin systems is the degree of simplicity commensurate with the exigencies of the preliminary planning stage.
W76-04014

COMMUNITY VALUES AND COLLECTIVE ACTION IN RESERVOIR DEVELOPMENT,
Iowa State Univ., Ames. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W76-04015

PREDICTION IN CATCHMENT HYDROLOGY.
Australian Academy of Science, Camberra.
For primary bibliographic entry see Field 2A.
W76-04128

NUMERICAL METHODS FOR PREDICTING PRECIPITATION IN CATCHMENT HYDROLOGY,
Australian Numerical Meteorology Research Centre, Melbourne (Australia).
For primary bibliographic entry see Field 2B.
W76-04129

STREAMFLOW IN CATCHMENT MODELLING,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W76-04135

EMPIRICAL METHODS AND APPROXIMATIONS IN THE DETERMINATION OF CATCHMENT RESPONSE,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
D. N. Body.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 293-304, 18 ref.

Descriptors: *Estimating equations, *Streamflow, *Hydraulic structures, *Design data, *Watersheds(Basins), *Rainfall-runoff relationships, *Reviews, Flood control, Flood peak, Rational formula, Unit hydrographs, Model studies, Statistical models, Water yield, Surface runoff.

A review is presented of the procedures which have been developed by practitioners to obtain design data for hydraulic structures associated with the control of natural stream flow. Because of requirements for simplicity, objectivity, and accessibility of data, these are not usually the methods which could be synthesised by the use of current research findings. The methods considered are flood peak formulae, the rational formula, unit hydrographs, statistical models, catchment yield estimation, and conceptual models. The adequacy of these procedures is considered in relation to current research developments. (See also W76-04128) (CSIRO)
W76-04141

MODEL EVALUATION, TESTING AND PARAMETERS ESTIMATION IN HYDROLOGY,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W76-04142

SYNTHETIC INPUT DATA TIME SERIES FOR CATCHMENT MODEL TESTING,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 2A.
W76-04144

PREDICTIVE USE OF CATCHMENT OUTPUTS,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
T. A. McMahon.
In: Prediction in Cacthment Hydrology. Australin Academy of Science, Canberra, Australia, 1975. p 371-425. 16 fig, 12 tab, 94 ref.

Descriptors: *Reviews, *Streamflow forecasting, *Reservoir yield, *Statistical models, Discharge(Water), Markov processes, Hydrologic data, Streamflow, Australia, Forecasting, Duration curves, Frequency curves, Low flow, Runoff forecasting.

A review of techniques for predicting outflow from catchments with or without reservoir storage is presented. An outline is given of techniques for defining streamflow data characteristics, and a range of values illustrating the diversity of Australian streamflow is tabulated. Data generation techniques, including Markov and related models, mixed autoregressive integrated moving average (ARIMA) models, and multi-site models, are discussed and compared. Major storage-yield methods are classified (into critical-period and probability-matrix types) and reviewed, with results of their application to Asutralian streams. Procedures for determining yield from unregulated catchments - flow duration curves and low flow frequency curves - are also considered. (See also W76-04128) (CSIRO)
W76-04145

TRENDS IN CATCHMENT MODELLING,
New South Wales Univ., Kensington (Australia). Faculty of Military Studies.
For primary bibliographic entry see Field 2A.
W76-04147

SURFACE WATER DATA, BRITISH COLUMBIA 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04150

INVENTORY OF CANADAIN FRESHWATER LAKES.
Department of the Environment, Ottawa (Ontario). Inland Waters Directories; Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 7C.
W76-04153

CANADA CENTRE FOR INLAND WATERS - 1973.
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-04155

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, NORTHWEST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environmental.
For primary bibliographic entry see Field 7C.
W76-04157

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, SOUTHEAST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environment.
For primary bibliographic entry see Field 7C.
W76-04158

REFERENCE INDEX - CANADA 1972 - HYDROMETRIC MAP SUPPLEMENT.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04160

NIAGARA RIVER ACOUSTIC STREAMFLOW MEASUREMENT SYSTEM,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7B.
W76-04165

REPORT FOR THE FISCAL YEAR 1972 - 1973: STUDY OF THE ST. LAWRENCE RIVER.
St. Lawrence River Working Group, Quebec.
Environment Canada, Ottawa, Canada, March, 1973. 16 p, 1 map, Available in English and French.

Descriptors: *St. Lawrence River, *Water resources, *Water quality, Industrial wastes, Effluents, Municipal wastes, Heavy metals, Mathematical models, TEMPERATURE, Remote sensing, Sedimentology, Planning, Geomorphology, Analysis, *Surveys, *Canada.
Identifiers: Waste water works, Bacteriology, Organic contaminants.

The Canada-Quebec St. Lawrence River Working Group is composed of representatives of Environment Canada, Canada Department of Transport, Quebec Water Board and the Quebec Department of Natural Resources. Projects carried out include studies of water quality, limnology, hydrology, and hydraulic sciences, dispersion and assimilation, public participation, socio-economic factors, thermal regime, and shoreline morphology. These aspects were studied in reference to various water uses; municipal and industrial water supply, conservation of aquatic fauna and flora; recreation, tourism, navigation, and hydro-electric power. Outlines and conclusions of major projects are given, with plans of the next year's operations. (Environment Canada)
W76-04166

SURFACE WATER DATA, ALBERTA 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04167

SURFACE WATER DATA, ALBERTA 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04168

SURFACE WATER DATA, ATLANTIC PROVINCES 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04169

SURFACE WATER DATA, SASKATCHEWAN 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04170

MONOGRAPH ON COMPREHENSIVE RIVER BASIN PLANNING.
Department of the Environment, Ottawa (Ontario).
Information Canada, Ottawa, 1975. 246 p, 9 fig, 13 tab, 120 ref, 2 charts.

Descriptors: *Comprehensive planning, *Planning, *River basin development, Water management(Applied), Institutions, Governments, Project planning, Evaluation, Mathematical models, Financing, Water resources development, Economics.
Identifiers: Information systems.

This treatise is concerned with the range of social, political, and biological problems which arise in a river basin as the population and the level of development in that basin increase. The approach used is one of reducing a complex problem to its individual elements, of analysing those elements and re-assembling them in the form of a plan for action. Wherever possible, the experience of the St. John River Basin planning program is used to illustrate specific points. The monograph is arranged in three parts which form the main stages of any planning process: the preliminary stage, the substantive planning stage, and the transition stage from planning to action. (Environment Canada)
W76-04175

MACKENZIE BASIN INTERGOVERNMENTAL LIAISON COMMITTEE - FIRST REPORT (TO DECEMBER 31, 1974).
Mackenzie Basin Intergovernmental Liaison Committee, Ottawa (Ontario).
For primary bibliographic entry see Field 6E.
W76-04176

STREAMFLOW REGIONALIZATION IN BRITISH COLUMBIA, NO 1, REGRESSION OF MEAN ANNUAL FLOODS ON PHYSIOGRAPHIC PARAMETERS,
Environmental Protection Service, Vancouver (British Columbia). Pacific Region.
For primary bibliographic entry see Field 2E.
W76-04180

CALIBRATION OF THE STATE WATER PLANNING MODEL FOR SUB-BASIN 42-KJ OF THE YELLOWSTONE RIVER BASIN,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
J. T. Weaver, J. Jaklin, E. P. Smouse, and T. T. Williams.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 667, $7.50 in paper copy, $2.25 in microfiche. Research Report No 73, Montana University Joint Water Resources Research Center, Bozeman, September 1975. 159 p, 23 fig, 22 tab, 13 ref, 4 append. OWRT B-029-MONT (8) and OWRT B-038-MONT (1).

Descriptors: *Reservoir operation, *Optimum development plans, Operations, *Planning, *Regression analysis, Hydrology, *Model studies, *Montana, Watershed management, Calibration.
Identifiers: *Yellowstone River Basin(Mont), Fort Union Basin(Mont), Planning models.

A series of three independent but closely related studies have been conducted at Montana State University, aimed at extending the usefulness of the already-developed Montana State Water Planning Model. Some aspects of the State Water Operations Model were also incorporated. Sub-Basin 42KJ consists of the reach of the Yellowstone River basin from the mouth of the Bighorn River at Custer, Montana downstream to the mouth of the Tongue River at Miles City. The area of the sub-basin was found by planimetering to be 4177 square miles. Calibration of the planning-model for Sub-Basin 42-KJ was undertaken in three separate studies: (1) Compilation of data, (2) Calibration of an annual and monthly model; (3) Manipulation of precipitation data to reflect effects of elevation and spacing of raingages. Two methods of estimating the precipitation volume in Basin 42-KJ were applied. Even if it is not known which method yields values closer to the true value, the second method with the adjustment for the elevation differences takes more factors from the meteorological processes in account, and seems to be the superior method if the following improvements could be made: (a) determining the hypsometric precipitation gradient for every season, (b) using a method for determining the influence area of gaging station, which takes orographic barriers into account, (c) using convex or concave slope model for the determinatoin of the mean precipitation of the areas between the contour lines.
W76-04232

RESEARCH PROGRAM - HYDROLOGY RESEARCH DIVISION - SUMMARIES OF PROGRESS AND SHORT RESEARCH REPORTS.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2A.
W76-04239

SURFACE WATER DATA ATLANTIC PROVINCES 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04248

SURFACE WATER DATA, YUKON AND THE NORTHWEST TERRITORIES 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04249

SURFACE WATER DATA, MANITOBA 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04250

REVIEW OF CANADIAN DESIGN PRACTICE AND COMPARISON OF URBAN HYDROLOGIC MODELS.
Maclaren (James F.) Ltd., Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W76-04254

USES OF WATER RESOURCES DATA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04255

SURFACE WATER DATA, ONTARIO 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04256

WATER QUALITY DATA, YUKON TERRITORY 1961 - 1973.
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Pntario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04257

FLOOD DAMAGE IN FREDERICTION.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04260

EFFICIENT RESERVOIR DESIGN FOR PLAYAS OF THE SOUTHERN HIGH PLAINS,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 3B.
W76-04296

AUSTRALIA DAMS AND STORAGES.
Department of Minerals and Energy, Canberra (Australia). Div. of National Mapping.
For primary bibliographic entry see Field 7C.
W76-04307

ANALYSIS AND SYNTHESIS OF FLOOD CONTROL MEASURES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
Hydrology Papers, No 76, September 1975. 95 p, 25 fig, 32 tab, 88 ref, 6 append.

Descriptors: *Flood control, Physical control, *Flood plain insurance, *Flood forecasting, *Flood plain zoning, Channel improvement, Reservoir storage, Systems analysis, Economic feasibility, Optimization, Computer programs, Planning.
Identifiers: *Arkansas River(Colo), *Isard-Chenery input-output model, Flood control planning.

By an approach of analysis and synthesis, flood control planning becomes more meaningful to both present and future flood control needs. A methodology was developed which incorporates four structural parts: (1) classification of flood control measures, (2) performance analysis of classified measures, (3) subsequent synthesis of various mixes of measures in order to obtain an optimal mix, and (4) impact of proposed measures on regional economy. Analysis of nonstructural measures, especially land use and insurance, demands a common yardstick in measuring costs and benefits comparable to those of structural measures. The methodology presented herein attempted to incorporate the difficult problem of interdependence of flood control measures. The methodology of analysis and synthesis of measures was tested on the Arkansas River Drainage Basin, above John Martin Dam in Colorado. The

economic synthesis of this method would enable a planner to examine the adverse effects of project proposal. Sociological, environmental, and sediment damages are potential factors in addition to direct flood damage. The Isard-Chenery regional input-output model could be applied to planning of flood control measures in a comprehensive and exhaustive manner, by making the hydrology-economics linkage a synthesis of flood control and regional economic performance. (Singh-ISWS)
W76-04308

ANALYSIS OF DROUGHT CHARACTERISTICS BY THE THEORY OF RUNS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W76-04310

APPLICATIONS OF MICROWAVES TO REMOTE SENSING OF TERRAIN,
Radiometric Technology, Inc., Wakefield, Mass.
For primary bibliographic entry see Field 7B.
W76-04314

FROM AEROSPACE PHOTOGRAPHS TO FORECASTING AND CALCULATING FLOWS,
For primary bibliographic entry see Field 7B.
W76-04325

RIVER RUN-OFF CONTROL,
N. A. Kartvelisvili.
Available from the National Technical Information Service, Springfield, Va 22161 as TT73-58029, $7.75 in paper copy, $2.25 in microfiche. Technical Translation TT 73-58029, 1974. 211 p, 60 fig, 9 tab, 63 ref. Translation of 'Regulirovanie-recnogo stroka', Gidrometeorologiceskoe-Izdatel'stvo, Leningrad (USSR), 1970. Translated for Bureau of Reclamation, Washington, D.C.

Descriptors: *Runoff, Water management(Applied), *Impoundments, *Hydroelectric plants, Powerplants, Sedimentation, Water pollution, Rivers, Streamflow, Dams, Reservoirs, Hydrology, Monte Carlo method, Stochastic processes, Markov processes.
Identifiers: *Runoff control theory, *USSR.

This monograph concerned a theory of river-runoff control in the present conditions of the integrated utilization of water. The main emphasis was placed on the water economy pattern and quantitative characteristics of its components. Description was given of the use of mathematical statistics and computers in the subject, which may ensure the optimum operating conditions for the employment of hydroelectric stations and other installations. The publication will prove valuable to hydrologists and designers in hydraulic engineering, as well as to workers in the field. Students and post-graduates will also find the book useful. (Sims-ISWS)
W76-04326

CASE STUDY OF A HYDROELECTRIC DAM: THE DICKEY-LINCOLN SCHOOL PROJECT,
Massachusetts Inst. of Tech., Cambridge. Civil Engineering Program.
For primary bibliographic entry see Field 6G.
W76-04347

SAMPLE FLOOD PLAIN ZONING ORDINANCE FOR LOCAL UNITS OF GOVERNMENT.
Minnesota Dept. of Natural Resources, St. Paul. League of Municipalities, Association of Cities.
For primary bibliographic entry see Field 6F.
W76-04356

FLOOD PLAIN MANAGEMENT FOR OREGON CITIES AND COUNTIES.
Oregon Univ., Eugene. Bureau of Governmental Research and Service.
For primary bibliographic entry see Field 6F.
W76-04357

ORDINANCE TO AMEND THE BUILDING CODE OF THE CITY OF GILLETTE, WYOMING.
For primary bibliographic entry see Field 6F.
W76-04358

AN ORDINANCE RELATING TO FLOOD PLAIN MANAGEMENT.
For primary bibliographic entry see Field 6F.
W76-04359

MINIMUM REQUIREMENTS FOR FLOOD CONTROL.
For primary bibliographic entry see Field 6F.
W76-04360

FLOOD PLAIN MANAGEMENT -- FPM-1 AND FLOOD INSURANCE PROGRAM.
Indiana Dept. of Natural Resources, Indianapolis.
For primary bibliographic entry see Field 6F.
W76-04361

MODEL FLOODWAY ORDINANCE (FLOODWAY REGULATION).
North Carolina General Assembly, Raleigh.
For primary bibliographic entry see Field 6F.
W76-04362

PROPOSED FLOOD DISTRICT ORDINANCE.
For primary bibliographic entry see Field 6F.
W76-04363

FLOOD HAZARD REGULATIONS (AMENDMENT TO THE BUILDING CODE).
For primary bibliographic entry see Field 6F.
W76-04364

INLAND WETLANDS: TECHNICAL DEFINITIONS DIRECTED TOWARD EMERGING POLICY ALTERNATIVES,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 6B.
W76-04389

GRAPHIC AND TABULAR SUMMARIES OF WATER AND SUSPENDED-SEDIMENT DISCHARGE DURING EIGHT PERIODS OF SYNOPTIC STORM SAMPLING IN THE LOWER DRAINAGE BASIN OF REDWOOD CREEK, HUMBOLDT COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W76-04398

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS,
Geologic Survey of Puerto Rico, San Juan.
D. G. Jordan.
Open-file report (Caribbean District), 1975. 51 p, 29 fig, 6 tab, 17 ref.

Descriptors: *Water resources, *Hydrology, *Surface waters, *Groundwater resources, *Virgin Islands, Hydrologic data, Rainfall, Streamflow, Runoff, Hydrogeology, Water yield, Groundwater recharge, Water quality, Water analysis, Chemical analysis.
Identifiers: *St Croix(V I).

St. Croix, Virgin Islands, consists of two mountainous volcanic rock cores separated by a graben containing clays with minor limestone and conglomerate that is overlain by about 300 ft of marl and limestone. Rainfall ranges from about 30 in. in eastern St. Croix to 55 in. in the northwestern mountains. Four streams, all heading in the Northside Range, have intermittent reaches. All other streams are ephemeral, flowing only for a few hours or days following major rainstorms. Flow in the intermittent streams ranges from about 1 to 9 percent of the total rainfall and usually half or more of the flow is storm runoff resulting from two or three major storms. Water in the volcanic rocks is basically a calcium bicarbonate sodium chloride type with dissolved solids ranging from 500 to 1,000 mg/litre, and chloride concentration of 100 to 300 mg/litre. By contrast, water in the limestone is a sodium bicarbonate sodium chloride type with dissolved-solids content ranging from less than 1,000 to more than 20,000 mg/litre and chloride concentration from less than 100 to more than 10,000 mg/litre. The groundwater potential (equivalent to the quantity of recharge) of St. Croix is estimated at 3.9 mgd. (Woodard-USGS)
W76-04399

MINERAL AND WATER RESOURCES OF SOUTH DAKOTA.
Geological Survey, Reston, Va.
Cooperative Report to the Committee on Interior and Insular Affairs, United States Senate, 94th Congress, 1st Session: Washington, U.S. Government Printing Office, 1975. 313 p, 51 fig, 47 tab, 256 ref.

Descriptors: *Water resources, *Mineralogy, *Natural resources, *South Dakota, Reviews, Hydrology, Water supply, Water demand, Available water, Surface waters, Groundwater, Water utilization, Water resources development, Evaluation, Publications, Bibliographies.
Identifiers: *Mineral resources(S Dak).

The fundamentals of the geology of the State of South Dakota are discussed in the detail necessary as background for mineral and water resources appraisals. References to thousands of pages of publications and many maps are included. The mineral deposits are discussed in three categories: (1) metallic minerals, (2) nonmetallic minerals, which also are commonly referred to as industrial minerals and rocks, and (3) the mineral energy sources. An important aspect in the understanding of the water resources is an accurate appraisal of their utilization and degree of development. A water use study by the U.S. Geological Survey for the year 1970 reveals a marked difference in water use practices between the glaciated area east of the Missouri River and the unglaciated area west of the river. On a statewide basis, of the total water withdrawn, irrigation requires 51 percent; farm-domestic purposes, 27 percent; and municipalities and industry 22 percent. Of the 453 million gallons per day withdrawn, surface waters supply 55 percent and groundwater sources furnish 45 percent. (Woodard-USGS)
W76-04400

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, Fla.
H. J. McCoy.
Open-file report FL-75007, 1975. 103 p, 11 fig, 12 ref.

Descriptors: *Hydrologic data, *Surface waters, *Groundwater, *Water quality, *Florida, Basic collections, *Streamflow, Flow rates, Gaging stations, Water wells, Water level fluctuations, Chemical analysis, Water analysis, Inorganic compounds, Organic compounds, Pesticides, Aquifers.
Identifiers: Collier County(Fla).

Streamflow and water-level fluctuations in Collier County, Fla., are grabbed for the 1974 water year (October 1973 to September 1974). Water-quality data are presented in table, graph, and diagram forms for their periods of record. Changes in hydrologic conditions are monitored by a data-collection network mainly in the western half of the county but in greater detail in the urbanized Naples area. The county-wide network consists of 4 streamflow gaging stations (plus 1 station not in network), 16 wells equipped with continuous water-level recorders, 32 wells samples semi-annually for chloride analyses, and 15 surface-water sites sampled semi-annually for nutrient analyses. The Naples network consists of 1 streamflow gaging station, 3 wells equipped with continuous water-level recorders, 91 wells sampled or measured semi-annually for chloride analyses or water-level fluctuations, and 4 surface-water sites sampled quarterly for analysis of chemical, physical, and bacteriological parameters. Data from Naples network are used to prepare water-table contour maps of the municipal well field area near the end of the dry season (May) and the wet season (October). (Woodard-USGS)
W76-04403

FLOW-DURATION AND LOW-FLOW FREQUENCY DETERMINATIONS OF SELECTED ARKANSAS STREAMS,
Geological Survey, Little Rock, Ark.
M. S. Hines.
Arkansas Geological Commission, Little Rock, Water Resources Circular No 12, 1975. 75 p, 7 fig, 3 tab, 25 ref, append.

Descriptors: *Hydrologic data, *Streamflow, *Flow duration, *Low-flow frequency, *Arkansas, Natural flow, Regulated flow, Flow measurement, Gaging stations, On-site data collections, Estimating, Flow rates, Methodology.

Analysis of regulated and unregulated streamflow records in Arkansas provides flow duration and low-flow frequency data for 290 sites, consisting of complete duration and low-flow frequency distribution at 107 continuous-record gaging stations and abbreviated information at 183 partial-record stations. Low-flow yield is closely associated with physiographic characteristics. Useful low-flow duration and frequency information can be estimated by comparing several discharge-measurement results with concurrent daily mean flow for appropriate gaging stations. A combination of mathematical and graphical methods of analysis provides the best determinations of flow duration and low-flow frequency. (Woodard-USGS)
W76-04406

MAGNITUDE AND FREQUENCY OF FLOODS IN SMALL DRAINAGE BASINS IN NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
O. A. Crosby.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-248 480, $4.00 in paper copy, $2.25 in microfiche. Water-Resources Investigations 19-27, May 1975. 24 p, 2 plates, 7 fig, 2 tab, 17 ref.

Descriptors: *Flood forecasting, *Peak discharge, *Small watersheds, *Streamflow, *North Dakota, Hydrology, Flood frequency, Model studies, Regression analysis, Gaging stations, Flood control, Topography, Runoff, Infiltration, Climatic data.
Identifiers: *Ungaged sites.

Methods are presented for estimating flood-peak discharges at 2- to 50-year recurrence intervals on North Dakota streams draining less than 100 square miles (259 square kilometres). For gaged sites, frequency estimates are provided directly. For ungaged sites, the method relates drainage area and(or) soil-infiltration index to peak discharges. The equations presented are for sites on streams with natural flow and are not applicable to urban areas or basins affected by man-made regulation. Information is also provided on the maximum flood magnitude experienced. (Woodard-USGS)
W76-04410

AMENDING THE WILD AND SCENIC RIVERS ACT.
For primary bibliographic entry see Field 6E.
W76-04437

MODIFYING SECTION 204 OF THE FLOOD-ING CONTROL ACT OF 1965.
For primary bibliographic entry see Field 6E.
W76-04438

CIVIL WORKS PROJECTS: LAKESHORE MANAGEMENT.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04450

AN ORDINANCE REGULATING THE USE OF FLOOD PLAIN AREAS.
Palatine, Illinois, Ordinance No 0-1-74 (1973), 7 p.

Descriptors: *Illinois, *Flood plains, *Water levels, *Flood damage, *Runoff, Storm water, Flood, Recreation, Sewage treatment, Parks, Hunting, Fishing, Structures, Buildings, Retaining walls, Culverts, Bridges, Concrete construction, Dams, Reservoirs, Application methods, Topographic mapping, Permits.
Identifiers: Palatine(Ill), *Flood base elevation, Developments, Accumulation, Pool elevation, Sanitary landfills, Density transfers.

In order to protect against flood damage, all lands deemed to be in the flood plain, as defined by this ordinance, and all lands adjacent to the flood plain and less than one foot above the level of the flood base elevation shall be permitted to be used for such purposes as recreation, wildlife sanctuaries, nurseries, orchards, outlet installations for sewage treatment plants, and utility transmission lines. Other specified uses can be made of such lands with the approval of the Village President and Board of Trustees; however, other designated uses, such as for most structures and buildings, are absolutely prohibited. If lands adjacent to the flood plain and less than one foot above the level of the flood base elevation are filled and the elevation thereof raised to one foot or more above the flood base elevation, buildings and structures can be constructed within such areas only when certain specified conditions are met. Flood Plain Areas may be utilized in calculating floor area or lot size density for an entire tract of land only in accordance with the conditions set forth in this ordinance. (Segall-Florida)
W76-04475

4B. Groundwater Management

RESPONSE TO TIDES OF COASTAL AQUIFERS: ANALOG SIMULATION VS. FIELD OBSERVATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2F.
W76-04002

GEOTHERMAL WATER RESOURCES IN ARIZONA: FEASIBILITY STUDY,
Arizona Univ., Tucson. Dept. of Geosciences.
D. Norton, T. Gerlach, K. J. De Cook, and J. S. Sumner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 475, $5.00 in paper copy, $2.25 in microfiche. Completion Report, August 1975. 49 p, 17 fig, 13 tab, 42 ref, append. OWRT A-054-ARIZ(2). 14-31-0001-5003.

Descriptors: *Geothermal studies, *Energy, *Thermal water, *Arizona, Feasibility studies.
Identifiers: *Hydrothermal systems, Hot dry rock, Magma tap, Thermal energy.

Conventional geothermal water resources of Arizona are apparently limited to an east-west trending belt about 100 miles wide within the Basin-Range province of Arizona and closely following the Gila River. Hot-dry rock and magma-tap types of geothermal energy may also be present within this zone as well as outside it as, for example, in the Flagstaff area. Numerous wells and springs with temperatures greater than 32C are found within the 100 mile-wide zone, and commonly their locations are coincident with linear features described by ERTS photographs. Application of geochemical geothermometers to these waters yields predicted reservoir temperatures up to 150C, although Tellier (1973) reports values up to 300 C for waters from this region. Well logs, core, and outcroppings of basin fill deposits in Safford Basin suggest that thermal waters are contained in coarse sand and conglomeratic basin fill reservoirs and possibly in lava flows and tuff deposits under the sediments which fill the basin. Shallow lacustrine deposits of evaporites and clays probably function as cap rocks in this area preventing mixing of warm deeper waters with cooler surface waters. Igneous rocks of very recent age are consistently found within the zone containing the thermal waters. These bodies represent the most probable source of thermal energy, although in Safford Basin heat may originate from exothermic hydration reactions of anhydrite in lacustrine evaporite deposits.
W76-04005

GRAPHICAL CALCULATION OF AQUIFER TRANSMISSIVITIES IN NORTHERN CATERBURY, NEW ZEALAND,
Cantebury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W76-04102

DRAWDOWN SOLUTIONS FOR SIMULTANEOUS DRAINAGE AND ET,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 101, No IR4, Proceedings Paper 11804, p 279-291, December 1975. 9 fig, 16 ref, 2 append.

Descriptors: *Drainage, *Seepage, *Drains, *Evapotranspiration, *Water table, Subsurface drainage, Ditches, Drawdown, Subsurface drains, Tiles, Drainage effects, Numerical analysis, Graphical methods, Deep percolation, Dupuit-Forchheimer theory, Groundwater movement, Soil water movement, Hydraulic conductivity.
Identifiers: *Drain spacing, *Water table drawdown, Deep seepage, Boussinesq equation.

Numerical methods were used to solve the nonlinear Boussinesq equation for water table drawdown between parallel drains. The solutions were compared to other methods of predicting drawdown for initially horizontal, parabolic, and elliptical profiles, and good agreement was found with methods that considered the nonlinear aspects of the governing equation. Solutions were presented in graphical form for simultaneous drainage and ET or deep seepage. Example problems were solved to show the use of these solutions for evaluating the effect of ET or deep seepage on water table drawdown and for considering this effect when predicting drain spacings to satisfy a predetermined drawdown rate. The solutions were also used in an example to explain apparent discre-

pancies in field tests of drain spacing equations. (Sanderson-ISWS)
W76-04103

HYDROGEOLOGICAL STUDY OF THE SELKIRK AREA, MANITOBA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
J. E. Charron.
Scientific Series No 8, 1974. 40 p, 38 fig, 6 tab, 12 ref.

Descriptors: *Hydrogeology, *Groundwater, *Water wells, *Water quality, Census, Aquifers, Base flow, Potable water, Reserve osmosis, Dye dispersion, Fluorescent dye, Gases, Carbon dioxide, Atmospheric pressure, Artificial recharge, Potentiometric level, Hardness(Water), *Canada.
Identifiers: Hydrogeochemistry, *Red River Valley(Manitoba).

The last six groundwater studies in the Red River Valley, Manitoba, is described. The study consisting mainly of a well inventory of over 3,000 wells in the Selkirk map area, was carried out during the summers of 1964 and 1965. The groundwater yield of the various aquifers is described both quantitatively and qualitatively. In the Selkirk map area, there is evidence of a more abundant supply of groundwater of good quality than exists in any of the other areas in the Red River Valley studied by the author. A description is included of an area in which gas exhalations (mainly CO2) occur with variation in barometric pressure. As the groundwater of this area has a lower than normal piezometric surface, the possibility of artificial recharge exists. (Environment Canada)
W76-04162

PROGRAM FRONT, TWO - DIMENSIONAL SIMULATION OF A MOVING INTRUSION FRONT IN A THIN HORIZONTAL CONFINED AQUIFER,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04172

PROGRAM TEBES, TRANSMISSIVITY, LEAKAGE FACTOR AND STORATIVITY FROM A LEAST SQUARES FIT OF RESIDUAL DRAWDOWN,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04181

STUDY OF GROUNDWATER FLOW IN RUSSELL COUNTY, ONTARIO,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environ,ent, Ottawa (Ontario). Inland Waters Directorate.
J. E. Charron.
Scientific Series No 40, 1974, 26 p, 31 fig, 3 tab, 11 ref.

Descriptors: *Groundwater, Flow, *Water quality, Groundwater basins, Wells, Water yield, *Canada, *Base flow.
Identifiers: *Groundwater yield, Russell County, *Ontario, Sulphate reduction, Topographic data, Geological data, Hydrogeochemical data, Groundwater flow, Recharge areas, Chloride bicarbonate water type, Groundwater quantity.

The average groundwater yield of the wells in Russell County is less than 10 gpm. Good potable groundwater is found in the county, but the quality in many areas leaves much to be desired because of a relatively high hydrogen sulfide or sodium chloride content. The predominant modifying phenomenon is sulfide reduction. Although it provides hydrogen sulfide, it also increases the carbon dioxide content of the groundwater. The latter makes the groundwater chemically active throughtout its entire flow. There is relatively large increase in the chloride value of the groundwater outside the recharge areas. By using topographic, geological and hydrogeochemical data, the directions of groundwater flow throughout Russell County have been indicated. These flows can be described as follows: a main eastward flow; flow into channels of the Champlain Sea; flow towards the Ottawa River; and flow from the west ending at Mer Bleue, with a high observed total dissolved solids value of 106,985 parts per million possibly owing to the effects of a shale aquiclude. The bedrock topography controls groundwater flow. It separates fresh and saline groundwater. The bedrock channels seem to guide the main eastward groundwater flow towards Alfred Bog in Prescott County. Vertical zonation of the groundwater exists, as shown by the fresh water floating on salty water. Finally, the groundwater can be said to evolve from a bicarbonate type of water in the recharge areas through a base exchange and sulfate reduction stage to become a chloride-bicarbonate type of water. (Environmental Canada)
W76-04237

GROUND WATER LAW: PROBLEM AREAS,
Arizona Univ., Tucson. Coll of Law.
R. E. Clark.
Natural Resources Lawyer, Vol 8, No 2, p 377-90, (1975). 14 p.

Descriptors: *Water resources development, *Aquifer management, *Water supply, *Groundwater, *Surface groundwater relationships, Management, Administration, Surface waters, Natural resources, Water quality, Recharge, Energy, Reasonable use, Streams, Pumps, Underground streams, Wells, Beneficial use, Prior appropriation, Flooding, Reservoirs, Conservation, Agriculture, Groundwater mining.
Identifiers: *Water depletion, Correlative rights.

There are many areas in which the law should provide improved procedures for the management of ground water and water resource generally. Carefully planned legislation rather than hurried amendments are needed. The three principal problems of ground water law, management, and administration are: (1) integrating management of surface water and ground water; (2) depletion of ground water aquifers at rates exceeding recharge; (3) and impairment of ground water quality. The National Water Commission has made nine recommendations which relate to management of surface and ground water sources and the depletion of aquifers. These proposals deserve attention because of the ad hoc development of ground water law to date. The four ground water theories that have emerged in the United States are discussed. They are the common law right of unlimited withdrawal from beneath one's land, the reasonable use rule, the correlative rights rule, and the prior appropriation doctrine as modified by individual states. Most ground water law has emerged in the past forty years. What is needed now is legislation that looks to the total supply of surface and ground water sources. (Seagall-Florida)
W76-04334

KANSAS UNDERGROUND STORAGE REGULATIONS.
Kansas State Board of Health, Topeka.
For primary bibliographic entry see Field 5G.
W76-04377

PRELIMINARY INVESTIGATION OF GROUND-WATER QUALITY AND ITS EFFECT ON SUBURBAN DEVELOPMENT IN WASHOE VALLEY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5A.
W76-04386

WATER-LEVEL RECORDS FOR COLORADO, 1971-75,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W76-04394

WATER-QUALITY DATA FROM OIL AND GAS WELLS IN PART OF THE PERMIAN BASIN, SOUTHEASTERN NEW MEXICO AND WESTERN TEXAS,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 7C.
W76-04395

INTERPRETATION OF GEOLOGIC AND HYDROLOGIC DATA FROM THE RAY-1 WELL, CITY OF GALLUP, MCKINLEY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
W. L. Hiss, and J. G. Marshall.
Open-file report 75-573, November 1975. 58 p, 3 fig, 1 tab, 4 ref.

Descriptors: *Well data, *Drilling, *Geology, *Lithologic logs, *New Mexico, Petrology, Geomorphology, Well casings, Collapse, Water yield, Forecasting.
Identifiers: *Gallup(N Mex).

The Ray-1 well was to be the third production well completed in the city of Gallup, N. Mex., Yah-ta-hey well field located about 7 miles (11 km) north of the city. The first string of casing collapsed during completion, however, and the well was abandoned before it could be tested. The lithology of the Upper Cretaceous Dalton Sandstone and Dilco Coal Members of the Crevasse Canyon Formation and the Gallup Sandstone was interpreted from geophysical logs and examination of the drill cuttings. These units appear to be similar to correlative strata encountered in the first two wells. A yield of approximately 700 gpm, similar to the other wells in the Yah-ta-hey well field, is anticipated from the same aquifers when the Ray-1 replacement well is completed. (Woodard-USGS)
W76-04396

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS,
Geologic Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 4A.
W76-04399

MINERAL AND WATER RESOURCES OF SOUTH DAKOTA.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4A.
W76-04400

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W76-04403

EFFECTS OF A LANDFILL OPERATION ON GROUND-WATER QUALITY IN NORTH BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W76-04404

POTENTIOMETRIC SURFACE AND AREAS OF ARTESIAN FLOW OF THE FLORIDIAN AQUIFER IN FLORIDA, MAY 1974,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W76-04405

COCKEYSVILLE QUADRANGLE: GEOLOGY, HYDROLOGY AND MINERAL RESOURCES,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 7C.
W76-04407

GROUND-WATER RESOURCES OF WAUKESHA COUNTY, WISCONSIN,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 2F.
W76-04408

DIGITAL MODEL SIMULATION OF THE GLACIAL-OUTWASH AQUIFER AT DAYTON, OHIO.
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 2F.
W76-04409

UNITED STATES GEOLOGICAL SURVEY'S HYDROGEOLOGICAL RESEARCH PROGRAMS AND PLANS RELATED TO DISPOSAL OF RADIOACTIVE WASTE INTO GEOLOGIC FORMATIONS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W76-04411

TREATMENT AND DISPOSAL OF ANIMAL WASTES IN MASSACHUSETTS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5D.
W76-04418

4C. Effects On Water Of Man's Non-Water Activities

HYDROLOGIC DATA SUMMARY: CLEARWATER RIVER BASIN, WATER YEAR 1973-1974,
Washington Univ., Seattle. Coll. of Forest Resources.
D. D. Wooldridge, A. G. Larson, and A. R. Wald.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 494, $4.50 in paper copy, $2.25 in microfiche. Washington Water Research Center, Pullman, Completion Report, June 1, 1975. 62 p, 1 fig, 58 tab, 2 ref. OWRT A-059-WASH(1). 14-31-0001-4048.

Descriptors: Water quality, Sediments, Suspended solids, *Hydrologic data, Data collections, *Streamflow, *Washington, Forest management, Land management, *Sediment yield, Fish.
Identifiers: Forest water yield, *Clearwater River Basin(Wash).

Research was conducted on the effects of certain forest land management practices on migratory fish in the Clearwater River Basin of the western Olympics. An understanding of the dynamics of stream flow and water quality is necessary to interpret the results of many phases of the fisheries studies. Data are presented in tabular form for mean daily flow in cubic feet per second and concentrations of suspended sediment. Total monthly discharge and sediment yields were also calculated. Annual runoff ranged from a high 204 area inches for the 5.86 square mile Christmas Creek basin to a low of 77.4 for Hunt Creek (1.19 sq. mi.). Maximum instantaneous streamflow was 477 cubic feet per second per square mile (cfsm) from the 2.3 square mile Bull Creek Basin. Many basins had maximums of 200 to 250 cfsm with a value of 172 cfsm for the Upper Clearwater River (97.3 sq. mi.). Low flow for the same station was 1.02 cfsm. Lowest values recorded were .25 to .30 cfsm during August and September from small upper basins. Maximum suspended sediment concentrations varied from less than 100 to 696 milligrams per liter. Annual suspended sediment transport varied from about 100 tons per square mile to over 2000 tons per square mile.
W76-04019

AQUATIC SURVEY OF SELECTED STREAMS WITH CRITICAL HABITATS ON NATIONAL RESOURCES LANDS AFFECTED BY LIVESTOCK AND RECREATION,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
R. N. Winget, and M. K. Reichert.
Final report, Supported by Bureau of Land Management, January 6, 1976. 109 p, 37 tab, 11 fig, 3 ref. 52500-CT5-1104.

Descriptors: *Watershed management, *Benthos, *Stream improvement, *Water quality, *Coliforms, Bank stability, Land management, Grazing, Cutthroat trout, Streams, Aquatic habitats, Baseline studies, *Basic data collections, Surveys, Recreation, Livestock, *Environmental effects.
Identifiers: *Environmental Impact Evaluation, National Resource Lands, Critical aquatic habitat, *Grazing impacts, *Recreational impacts.

Surveys were conducted to provide aquatic habitat and water quality baseline data to the Bureau of Land Management to be used in evaluating (1) livestock grazing impacts on the flora and fauna of Big, Birch, Thoms, and Trout Creeks; and (2) impacts from recreational use on the potable water supply and aquatic ecosystem of Rock Creek. Included in the analyses are: descriptions of existing aquatic habitats; characterization of macroinvertebrate communities; and a water quality summary for each stream. The assemblage, analysis, and recommendations presented will form the basis of land/water management decisions and future studies involving aquatic habitats and related fauna in these Utah streams. Preliminary analyses indicate: riparian vegetation is probably one of the most critical factors of quality aquatic habitats in small mountain streams; and near optimum riffle to pool ratios are important as too many pools reduce macroinvertebrate diversity and density and too much riffle eliminates needed fish habitats. (BLM)
W76-04042

QUALITY OF WATER DISCHARGED FROM AN URBAN MOTORWAY,
Severn-Trent Water Authority, Birmingham (England). Dept. of Operations.
For primary bibliographic entry see Field 5B.
W76-04104

SPECIAL CHARACTERISTICS OF URBAN HYDROLOGY,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Progeam.
For primary bibliographic entry see Field 2A.
W76-04138

CATCHMENT MODELS FOR URBAN AREAS,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 2A.
W76-04139

PREDICTING PROFILES OF SNOWDRIFTS IN TOPOGRAPHIC CATCHMENTS,
Forest Service (USDA), Laramie, Wyo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-04288

LEGAL PROBLEMS INVOLVED IN DEVELOPING WATER SUPPLIES FOR ENERGY DEVELOPMENT,
Debevoise and Liberman, Washington, D.C.
For primary bibliographic entry see Field 3E.
W76-04336

WATER DEMANDS FOR ENERGY DEVELOPMENT,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W76-04337

4D. Watershed Protection

ANALYSIS OF THE SEDIMENT FILTERING ACTION OF GRASSED MEDIA,
Kentucky Water Resources Research Inst., Lexington.
B. J. Barfield, and D. T. Y. Kao.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 501, $4.50 in paper copy, $2.25 in microfiche. Research Report No 90, December 1975. 50 p, 14 fig, 3 tab, 19 ref. OWRT A-049-KY(1). 14-31-0001-4017, 14-31-0001-5017.

Descriptors: *Sediment transport, *Erosion control, Suspended load, Bed load, Turbulence, Grassed waterways, Sediment yield, *Trap efficiency, Filtration, Filters, Open channel flow, Model studies.
Identifiers: Grass filters, Turbulent hydraulics, Gaf method, Einstein method.

The movement of sediment in non-submerged flow through a rigid grass media was studied experimentally by simulating the media with cylindrical nails. Models of sediment movement were developed from probabilistic reasoning and from the use of existing parameters describing total bed material in open channel flow. In the probability analysis, the percent sediment trapped was found to be a power function of the number of potential fall paths, Nf, a particle could make from the surface to the bed while traveling through the filter media. The percent trapped was also found to be an inverse power function of the Reynolds number ReT. The characteristic length used in the Reynolds number was a hydraulic radius calculated assuming rectangular open channel flow with a width equal to the spacing between elements and a depth equal to the depth of flow. This is defined as the spacing hydraulic radius, Rs. The percent trapped was finally related exponentially to a combined power function of Nf and ReT: Total bed material transport functions of Graf and Einstein were modified and evaluated as predictors of suspended and bed load. Bed shear was assumed to be equal to gamma RsS where gamma is the weight density of water and S is channel slope. Both Graf's and Einstein's parameters were found to be good predictors of suspended and bed load. (Huffsey-Kentucky)
W76-04009

PREDICTION IN CATCHMENT HYDROLOGY.
Australian Academy of Science, Camberra.
For primary bibliographic entry see Field 2A.
W76-04128

TRANSPORT OF MATERIALS IN STREAMS,
Melbourne Univ., Parkville (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W76-04136

USE OF PHYSICAL PROCESS MODELS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 2A.

W76-04140

CALIBRATION OF THE STATE WATER PLANNING MODEL FOR SUB-BASIN 42-KJ OF THE YELLOWSTONE RIVER BASIN,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4A.
W76-04232

SEDIMENT DATA - CANADIAN RIVERS 1971.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04251

THE NEEDS FOR WATER QUALITY MODELS ON AGRICULTURAL WATERSHEDS,
Southeast Environmental Research Lab., Athens, Ga.
For primary bibliographic entry see Field 5B.
W76-04353

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

A STUDY OF CONTINUOUS WATER QUALITY MONITORING SYSTEMS,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
F. C. Larson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 502, $5.00 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Report No 45, October, 1975. 86 p, 10 tab, 11 fig. OWRT A-022-TENN(3). 14-31-0001-3843.

Descriptors: Water quality, *Monitoring, *Data collections, *Instrumentation, *Measurement, *Control systems, Tennessee, Impoundments, *Pollutant identification.

A continuous water quality robot monitoring system was evaluated. This report presents a description of the State of the Art, the system used, laboratory and field performance testing of the equipment. Also included are studies on adaptability, economy, efficiency, portability, and reliability of the system on a Tennessee Valley Authority impoundment in East Tennessee. Data indicate that a continuous water quality monitoring system can provide relevant information for use in a water quality study.
W76-04006

UPTAKE AND DISTRIBUTION OF TRACE METALS IN FISH,
Purdue Univ., Lafayette, Ind. Dept. of Bionucleonics.
For primary bibliographic entry see Field 5C.
W76-04010

A CASE STUDY OF NON-POINT SOURCE POLLUTION IN VIRGINIA,
Virginia Polytechnic Inst. of and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-04011

STUDIES ON THE EFFECTS OF THERMAL ADDITIONS ON SELECTED ZOOPLANKTON POPULATIONS,
Minnesota Univ., Duluth. School of Medicine.
For primary bibliographic entry see Field 5C.
W76-04012

CHEMICAL COMPOSITION OF SNOW IN THE EAST CENTRAL SIERRA NEVADA,
Max C. Fleishmann Coll. of Agriculture, Reno, Nev.
For primary bibliographic entry see Field 2C.
W76-04018

WASTE WATER PROBLEMS OF DESIZING WITH RESPECT TO LEGISLATIVE MEASURES (ABWASSERPROBLEME BEIM ENTSCHLICHTEN UNTER BERUECKSICHTIGUNG GESETZGERBERISCHER MASSNAHMEN),
For primary bibliographic entry see Field 5D.
W76-04031

POLLUTION MEASUREMENT IN ELECTROPLATING (A PROPOS DE LA MESURE DE LA POLLUTION EN GALVANOPLASTIC),
J. Benezech, and R. Wilmotte.
Galvano Organo, No 457, p 665-667, 1975. 1 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Metals, *Pollutants identification, Water analysis, Analytical techniques, Chemical oxygen demand, Biochemical oxygen demand, Bioassays, Toxicity.
Identifiers: Equitox units.

Standard and recommended methods for the measurement of water pollution in electroplating plants are presented. The suspended matter content of the waste waters is determined by simple weighing after filtration of centrifugation, while the oxidizable matter content is determined after 2-hr decantation through the measurement of the COD and BOD5 values. The soluble salt content is found by measuring the electrical conductivity in siemens/cm, and the value obtained is multiplied by the flow rate. Inhibiting substances are measured according to AFNOR T 90 301 standard, using Daphnia as a test organism in equitox units (one equitox quantity of the inhibiting substance per cu m being such that causes immobilization of 50 percent of the animals in 24 hr under standardized conditions). Such equitox values have been determined for copper (9,000), cadmium (2,800), chromium (1,350), sodium cyanide (670), aluminum (79), iron (41), sulfuric acid (37), Hydrochloric acid (39), nitric acid (20), ammonia (14), and tin (9). These values indicate that copper in waste water is 1,000 times more toxic than tin. All inhibiting substances are characterized by a specific water pollution coefficient by which the quantity of the substances purchased in one year is multiplied to obtain the number of equitox units per day. (Hamuth-FIRL)
W76-04038

A SIMPLE METHO DTHE FOR DETECTION OF FLOATING OILS ON WATER, (IN JAPAN),
Government Industrial Research Inst., Osaka (Japan).
K. Hagiwara, T. Tanaka, Y. Murakami, K. Hiiro, and A. Kawahara.
Japan Analyst, No 7, p 794-795, 1974. 1 fig, 2 tab.

Descriptors: *Oil wastes, *Oil spills, *Pollutant identification, *Polymers, Measurement, Photometry, Absorption, Oil pollution.
Identifiers: Japan, Floating oils.

Equipment for the detection of floating oils on water has been designed. This newly patented method is based on collection of the oils on a polymer film and photometric measurement of the light absorption in the visible region of the film adhered to the oils. Floating oil films a few microns in thickness on water adhere to a polymer film, such as polypropylene or polyvinyl chloride. Most common oils do not absorb light in the visible region. If a transparent film is used to collect the oils, the absorbance of the film at the visible region is not appreciably increased. However, if a translucent film is used to collect the oils, the film is clarified by adhesion of the oils. Detection of the floating oils on water is accomplished by measuring the absorbance of the translucent film in the visible region (650 nm). (Orr-FIRL)
W76-04062

IDENTIFICATION AND DETERMINATION OF 1,4-BENZOQUINONE IN WASTE WATER OF THE COAL WORKING INDUSTRY (ZUR IDENTIFIEZIERUNG UND BESTIMMUNG VON 1,4-BENZOCHINON IN ABWAESERN DER KOHLEVERARBEI- TENDEN INDUSTRIE),
H. Thielemann.
Wasser-und Abwasser-Forschung, Vol. 7, No. 3, p 91-93, 1974. 1 tab, 4 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Pollutant identification, Chromatography, Chemical wastes, Toxicity.
Identifiers: 1,4-Benzoquinone, Thin-layer chromatography.

An identification and semiquantitative determination of 1,4-benzoquinone in waste water from the coal working industry is necessary because of its toxicological, hydrobiological, and chemical aspects. 1,4-Benzoquinone is a non-biodegradable toxic substance. The determination of it in these waste waters is performed by using a thin-layer chromatographic method. A sensitive spray-reagent for 1,4-benzoquinone is 4-aminoantipyrin in a two percent solution. (Kramer-FIRL)
W76-04074

HEAVY METAL POLLUTION IN THE SEDIMENTS OF THE COEUR D'ALENE RIVER DELTA,
Idaho Univ., Moscow. Dept. of Chemistry.
D. Maxfield, J. M. Rodriguez, M. Buettner, J. Davis, and L. Forbes.
Environmental Pollution, Vol. 7, No. 1, p 1-6, 1974. 5 fig, 1 tab, 4 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Pollutant identification, Rivers, *Idaho, *Mining, Mine wastes, *Sediments, Cadmium, Lead, Copper, Silver, Zinc.
Identifiers: Antimony.

Data on distribution, extent and concentration of heavy metals in the sediments of the Coeur d'Alene River, Idaho, were obtained. The sediments collected were mostly fine silt typical of mine tailings. High concentrations of antimony, cadmium, copper, lead, silver, and zinc were present in the sediments. It appears that the metal content in the sediments deposited in recent years has been about the same. The variations in metal content of the different layers appeared to be related to the composition of the sediments. (Orr-FIRL)
W76-04091

AN AERIAL-PHOTOGRPHIC ANALYSIS OF THE ENVIRON'MENTAL IMPACT OF CLAY MINING IN NEW JERSEY,
Earth Satellite Corp., Washington, D.C. Geosciences and Environmental Applications Div.
D. Garofalo, and F. J. Wobber.
Photogrammetria, Vol. 30, No. 1, p 1-19, February, 1974. 10 fig, 5 tab, 4 ref.

Descriptors: *Mining, *Environmental effects, *Monitoring, *Pollutant identification, Costs, *Clay minerals, *New Jersey, Aerial photogaphy, Remote sensing, Water pollution effects.
Identifiers: *Surface clay mining.

An examination of surface clay mining in New Jersey has shown that black and white, color, and color-infrared aerial photography at 1:20,000 scale or larger can provide data for the monitoring of the environmental effects of surface mining. High-altitude color and color-infrared photography is an efficient technique for rapid statewide mining inventories or for studies of large surface mining operations. Color-infrared photographs are a graphic method for identifying the location of surface-mined areas and for determining the environmental impact upon vegetation. Analysis of natural color photographs yields information such as the color differences indicative of turbidity and general chemical quality. Aerial photographs are cost-effective and enable mineral development to continue with a better understanding of environmental consequences. (Orr-FIRL)
W76-04092

NAQUADAT USERS MANUAL,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04156

HYDROGEOLOGICAL STUDY OF THE SELKIRK AREA, MANITOBA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 4B.
W76-04162

INDUSTRIAL WATER RESOURCES OF CANADA; HUDSON BAY, LABRADOR AND ARCTIC DRAINAGE BASINS, 1959-1965,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 3E.
W76-04163

REPORT FOR THE FISCAL YEAR 1972 - 1973: STUDY OF THE ST. LAWRENCE RIVER.
St. Lawrence River Working Group, Quebec.
For primary bibliographic entry see Field 4A.
W76-04166

WATER QUALITY DATA, BRITISH COLUMBIA 1961 - 71.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate; Department of the Environment, Ottawa (Ontario). Water Quality Branch.
For primary bibliographic entry see Field 7C.
W76-04171

EXPERIMENTAL BURNING OF WASTE OIL AS A FUEL IN CEMENT MANUFACTURE,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
E. E. Berry, L. P. MacDonald, and D. J. Skinner.
Technology Development Report, EPS 4-WP-75-1, June 1975. 187 p, 9 fig, 75 tab, 41 ref, 7 append.

Descriptors: *Oil pollution, *Oil wastes, *Fuels, *Cements, Lead, Zinc, Phosphorus, *Burning, Bromine, Solid wastes, Dusts, *Gases, *Air pollution effects.
Identifiers: Exhaust gases, By-pass system, Mass balance.

An experimental program was carried out at the St. Lawrence Cement Company Limited, Mississauga, Ontario, in which 330,000 gallons of used lubricating oil were burned as a portion of the total fuel requirement for a dry-process cement kiln. The system tested uses a dual four-stage preheater with a by-pass. The oil was primarily composed of automotive crankcase drainings and contained approximately .6 percent lead, .15 percent bromine, .1 percent zinc and .1 percent phosphorus. Lead, zinc and phosphorus emissions in the kiln exhaust gases were not increased during waste oil burning. A small reduction in particulate emissions was found during waste oil burning. A small increase in bromide emissions was also found. A material balance was carried out for Pb, Br, Zn, and P to confirm the emission data. It is indicated that these elements were retained in the process solids. Lead, zinc, phosphorus and some of the bromine were retained in the collected dust from the precipitator on the by-pass system. (Environment Canada)
W76-04177

MONITORING OF EFFLUENT STREAMS.
Food Technology, Vol 28, No 2, p 64, February, 1974.

Descriptors: *Food processing industry, *Industrial wastes, *Monitoring, *Oil wastes, *Pollutant identification, Adsorption, Effluents, *Effluent streams.
Identifiers: Dispersed Oil in Water Monitor(DOW), Ultraviolet light.

A method for monitoring effluent streams using a D.O.W. (Dispersed Oil in Water) Monitor was developed by C-E Invalco of Tulsa, Oklahoma. The principle of operation is that clean, clear water transmits UV light with very little absorption while most petroleum oils and their derivatives partially or completely absorb UV light. Variations in absorption therefore provide a sensitive and accurate determination of oil contained in water. The monitor's dual-beam-light measuring system continuously monitors the UV absorption rate in a stream. A continuous 30-day chart recorder registers oil content on a percent absorption basis. Detection range if 0-150 ppm, with accuracy of plus or minus 5 percent. The monitors operate with samples of up to 175 F and working pressures of 60 psig. (Murphy-FIRL)
W76-04187

MEASUREMENT OF ADENOSINE TRIPHOSPHATE (ATP) IN TWO PRECAMBRIAN SHIELD LAKES OF NORTHWESTERN ONTARIO,
J. W. M. Rudd, and R. D. Hamilton.
J Fish Res Board Can, 30(10): 1537-1546, Illus, 1973.

Descriptors: *Phosphates, Lakes, *Canada, *Pollutant identification, Measurement, Chlorophyll, Seasonal, Primary productivity, Water pollution effects, Carbon.
Identifiers: *Precambrian Shield Lakes(Ontario), *Adenosine triphosphate.

Profiles of the ATP concentrations occurring in the particulate material of 2 experimental shield lakes were obtained with respect to time. Large seasonal changes were evident, as were specific sites of high biological activity due either to natural stratification or to deliberate manipulation. Chlorophyll a, particulate carbon and direct count data are misleading in specifying the changes or the sites of biological activity. Analysis of the ATP on the basis of the relative abundance of different size fractions is useful. An ATP filtration error could not be demonstrated, indicating that cell breakage is not a source of the filtration error inherent in some 14C primary and secondary productivity studies.--Copyright 1974, Biological Abstracts, Inc.
W76-04193

AN EVALUATION OF SQUOXIN ON INSECT DRIFT,
Idaho Univ., Moscow. Dept. of Entomology.
M. A. Brusven, and C. MacPhee.
Trans Am Fish Soc, 103(2): 362-365, 1974.

Descriptors: *Idaho, Rivers, Insects, Mayflies, Sampling, Pollutant identification, Water pollution sources.
Identifiers: Baetis-bicaudatus, Baetis-tricaudatus, Brachycentrus-sp, Cinygmula-sp, Epeorus-longimanus, Ephemerella-flavilinea, Ephemerella-tibialis, Hydropsyche-sp, Trichoptera, *Insect drift, *Squoxin, *St. Joe River(Idaho).

An analysis of 54 drift net samples obtained over a 72-h period in riffle areas of the St. Joe River, Idaho, showed that a distributed concentration of 0.1 mg/(100ppb) of 1,1-methylenedi-2-naphthol for a 13-h period cause no significant increase in insect drift during the sampling period. Eight species (Ephemerella flaviline, E. tibialis, Epeorus longimanus Cinygmula sp., Baetis bicaudatus, B. Tricaudatus, Hydropsyche sp. and Brachycentrus of insects in the orders Trichoptera and Ephemeroptera represented 87% of the total drift insects. All species drifted in greater abundance during the night.--Copyright 1974, Biological Abstracts, Inc.
W76-04206

GAS-EXCHANGE RATES IN A MALL LAKE AS DETERMINED BY THE RADON METHOD,
For primary bibliographic entry see Field 5B.
W76-04219

STUDY OF GROUNDWATER FLOW IN RUSSELL COUNTY, ONTARIO,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environ,ent, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W76-04237

LAND DISPOSAL OF SEWAGE SLUDGE, VOLUME II, (APRIL, 1973-MARCH, 1974).
Guelph Univ. (Ontario). Dept. of Land Resource Science; and Guelph Univ. (Ontario). Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W76-04247

WATER QUALITY DATA, YUKON TERRITORY 1961 - 1973.
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Pntario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04257

METHOD AND APPARATUS FOR MEASURING SEWER SEDIMENTATION INFILTRATION AND FLOW,
E. Woo.
US Patent No 3,922,921, 4 p, 10 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 80, December 2, 1975.

Descriptors: *Patents, *Sewerage, Sewers, Sewage effluents, Flow, Conduits, Groundwater, *Infiltration, Infiltration rates, *Sedimentation, Measurement, Flow measurement, Instrumentation, Gages, Water pollution control, *Pollutant identification.

A device for quick and economical measurement of infiltration, sedimentation and liquid flow through a sewer pipe is described. Infiltration or ground water that enters sewer lines through broken or defective pipes and loose joints reduces the capacity of sewer systems and treatment facilities to hangle domestic and industrial waste waters. Frequently, infiltration increases water pollution and causes health hazards when waste water by-passes the treatment facilities or o"

flows the sewer system. Waste water treatment of infiltration requires larger treatment works with increased costs. This apparatus does not require a person to descend into a manhole because all measurements are recorded on the surface. The apparatus includes an enlongated probe which has an elongated tether member attached to the lower portion of the probe. A water buoyant float member is attached to the other end of the tether member and a vertically spaced sighting structure is supported from the probe at one side generally parallel to the probe. The float is tethered to a clamp by means of an adjustable length flexible tether to be adjusted so as to have an effective length greater than the elevation of the clamp above the lower terminal end of the probe. The probe is adjustable in effective length and a protractor is provided at the upper end of the probe. (Sinha-OEIS)
W76-04275

METAL CONTENTS OF LAKE SEDIMENT CORES FROM ESTABLISHED MINING AREAS: AN INTERFACE OF EXPLORATION AND ENVIRONMENTAL GEOCHEMISTRY,
Geological Survey of Canada Ottawa, (Ontario). Resource Geophysics and Geochemistry Div.
For primary bibliographic entry see Field 5B.
W76-04291

THE EFFECT OF CLIMATE ON THE CHEMISTRY OF CARBONATE GROUNDWATER,
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 2F.
W76-04297

GUIDELINES ON SAMPLING AND STATISTICAL METHODOLOGIES FOR AMBIENT PESTICIDE MONITORING.
Federal Working Group on Pest Management, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 798, $4.25 in paper copy, $2.25 in microfiche. Report, October 1974. 61 p, 25 ref.

Descriptors: *Sampling, *Pesticides, *Monitoring, *Methodology, Air, Water, Soils, Estuaries, Fish, Wildlife, Foods, Feeds, Human pathology, Pesticide residues, Environment, Environmental control, *Pollutant identification, Pollutants.

Monitoring, as included in the National Pesiticide Monitoring Program, is defined as the repeated sampling and analysis of components of the environment to produce estimates of pesticide residue levels in these components and the changes in these levels with time. This report was to be designed for use by people with some familiarity with field sampling operations although not necessarily with ambient sampling for pesticide residues. Such people will most likely be associated with a federal or state agency, university or large private contractor involved with an extensive monitoring program. The guidelines were organized under these chapter headings: (1) statistics and study design, (2) air, (3) soil, (4) the hydrologic environment, (5) estuaries, (6) fresh water fish, (7) wildlife, (8) food and feeds, and (9) human tissues. General procedures were suggested for each of these areas. The variability encountered in sampling various media from different geographical regions and with different program objectives, precludes the establishment of fixed methodologies. (Sims-ISWS)
W76-04315

PRELIMINARY INVESTIGATION OF GROUND-WATER QUALITY AND ITS EFFECT ON SUBURBAN DEVELOPMENT IN WASHOE VALLEY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
A. Armstrong, and J. Fordham.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 801, $3.50 in paper copy, $2.25 in microfiche. Report of Progress, December 1975. Water Resources Center. 15 p, 3 fig, 6 tab, 1 ref, 2 append. OWRT A-065-NEV(1). 14-31-0001-5028.

Descriptors: *Nevada, Groundwater movement, *Chemical analysis, *Water quality, Water wells, *Flow rates, Streamflow, Data collections, *Fluorides, *Areal hydrogeology, Valleys, Watersheds(Basins), *Suburban areas, Urbanization.
Identifiers: Washoe Valley(Nev), *Groundwater quality.

In response to a severe water quality problem in the New Washoe City-Washoe Farms portion of the Washoe Valley, Nevada, a water quality study was initiated in November 1974. During the first year of study, 220 water samples were collected for chemical analysis from domestic wells and streams flowing into the valley. In addition, the rates of flow were measured, on a monthly basis, of inflowing streams. The study has yielded knowledge not previously available. This information is, however, subject to revision and refinement as the sampling program continues. The major points are: (1) Surface inflow may be eliminated as the direct source of contaminants in the ground water of the New Washoe City-Washoe Farms area. (2) A more accurate estimate of the volume of surface inflow to the valley than was previously possible, can now be made. (3) The areal occurrence of fluoride, which constitutes the major water quality problem, may be described as well as numerous other constituents of interest. (4) A relationship between well depth and fluoride concentration is now apparent. (5) The areal variations in ground-water quality may be described. (Fallon-Nevada)
W76-04386

CHEMICAL ANALYSIS AND PROCESS CLASSIFICATION OF CONSTITUENTS OF EFFLUENTS (ORGANIC NITROGEN IN ACTIVATED CARBON EFFLUENTS),
Connecticut Univ., Storrs. Inst. of Water Resources.
T. B. Helfgott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 816, $3.50 in paper copy, $2.25 in microfiche. Research Project Technical Completion Report, December 1975. 22 p, 2 fig, 3 tab, 4 ref. OWRT A-030-CONN(9). 14-31-0001-5007.

Descriptors: *Chemical analysis, *Nitrogen compounds, *Municipal wastes, *Amino acids, *Activated carbon, *Ion exchange, *Electrodialysis, *Waste water treatment, Environmental effects, Public health, Ozone, Biological treatment, *Pollution identification, Effluents.
Identifiers: Residual nitrogenous organics, Process response, Ozonation, Effluents of biological treatment.

The purpose is to characterize by process response and chemical analysis the residual organic constituents in waters, especially the nitrogen-bearing components of wastewater treatment effluents following biological treatment and advanced wastewater treatment steps such as the activated carbon process. Special real-time (quick instrumentation measurement) techniques have been developed to make precise, accurate and sensitive determinations necessary to measure nitrogen in its transient forms (from organic nitrogen to ammonia to nitrate) as the nitrogen passes through the several unit operations and processes necessary in wastewater treatment to remove nitrogenous organics. Research has shown that there are residual and refractory organics in municipal wastewaters as measured by total organic carbon (approximately 3 mg/l TOC), that are dispersed, are non-adsorbable onto activated carbon, are cationic at high pH (approximately 9-16) and resist ozonation degradation. The residual organics have been specifically identified as some basic amino acids - lysine, arginine and ornithine - in polypeptide form. These small, charged microcolloids can be removed from treatment water by processes that take advantage of the charge on these nitrogenous organics. The processes that can remove the polymeric forms of basic amino acids are ion exchange and electrodialysis. (de Lara-Connecticut)
W76-04387

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1970: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN, AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04392

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W76-04393

WATER-QUALITY DATA FROM OIL AND GAS WELLS IN PART OF THE PERMIAN BASIN, SOUTHEASTERN NEW MEXICO AND WESTERN TEXAS,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 7C.
W76-04395

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS,
Geologic Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 4A.
W76-04399

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W76-04403

GROUND-WATER RESOURCES OF WAUKESHA COUNTY, WISCONSIN,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 2F.
W76-04408

CATTLE FEEDLOT WASTEWATER SALINITY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
T-F. Tsao.
MS Thesis, March 1972, 80 p, 15 fig, 19 tab, 44 ref.

Descriptors: *Farm wastes, *Feed lots, *Cattle, Waste water(Pollution), *Salinity, Agricultural runoff, Feeds, Nutrients, Sampling, Chemical analysis, *Pollutant identification, Water pollution sources.

Cattle manure samples from different feedlots with different salt concentrations in the feed were analyzed to determine how the salt concentration in the feed affects the salinity of the manure solution. Fresh manure samples from different pens of both university feedlots and commercial feedlots were collected for laboratory analysis. It was found that the more salt cattle feed contains, the higher is the specific conductance of the manure solution and the greater is the dissolved volatile and non-volatile solids content in the fresh manure. The logarithm of the sodium-adsorption-ratio of the one percent manure solution is proportional to the specific conductance of the solution. These facts demonstrate that the salt in cattle feed increase the water salinity problem of cattle feedlot runoff. (Cartmell-East Central)

W76-04429

FECAL COLIFORM POLLUTION IN AN AGRICULTURAL ENVIRONMENT,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
For primary bibliographic entry see Field 5B.
W76-04432

WATER QUALITY AND POLLUTANT SOURCE MONITORING.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04444

5B. Sources Of Pollution

A CASE STUDY OF NON-POINT SOURCE POLLUTION IN VIRGINIA,
Virginia Polytechnic Inst. of and State Univ., Blacksburg. Dept. of Civil Engineering.
L. L. Harms, and E. V. Southerland.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 551, $4.50 in paper copy, $2.25 in microfiche. Virginia Water Resources Research Center, Blacksburg, VPI-VWRRC-Bulletin 88, October 1975. 62 p, 9 fig, 7 tab, 39 ref. OWRT A-053-VA(2).

Descriptors: *Virginia, *Agricultural runoff, *Urban runoff, Sewage treatment, Treatment facilities, *Water pollution sources, Pollutant identification, *Organic matter, *Sediments, *Nutrients, Phosphorus, Algae, Path of pollutants.
Identifiers: *Non-point source, Pollution, *South River(Virginia).

Sources of organic matter, sediment, and nutrients were investigated for the Upper South River Basin near Waynesboro, Virginia. The study period extended from the end of April until mid-September, 1974, a total of 135 days. During the study period, 156 samples were collected with the following analytical determinations being made on each sample: chemical oxygen demand, total suspended solids, turbidity, specific conductance, total kjeldahl nitrogen, and nitrate. Flow measurements were also made at the sampling stations in order that total yields of materials could be established. Sources of organic matter, sediment and nutrients were agricultural, forest and urban land drainage in addition to domestic and industrial wastewater effluents. For each pound of phosphorus recorded in the river, about 10 pounds of nitrogen and 75 pounds of sediment were also present. Point sources accounted for an insignificant portion of the sediment, 2.1 percent, but were the major source of all other contaminants during the study. However, the point source contributions were overshadowed by non-point discharges during major storm events. Agricultural land drainage was a greater source of contamination than forest drainage. Urban runoff contributed substantial pollutant loads during runoff periods. The Waynesboro sewage treatment plant was the greatest source of phosphorus in the basin studied. Reduction of phosphorus in the Waynesboro sewage treatment plant effluent may reduce excessive algal production in the South River below Waynesboro.
W76-04011

OXIDATION OF LAKE AND IMPOUNDMENT HYPOLIMNIA,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 5C.
W76-04016

CADMIUM-INDUCED HISTOPATHOLOGICAL CHANGES IN GOLDFISH,
For primary bibliographic entry see Field 5C.
W76-04043

VERTICAL EDDY DIFFUSION STUDIES IN THE THERMOCLINE OF A SMALL STRATIFIED LAKE,
R. Hesslein, and P. Quay.
J Fish Res Board Can. 30(10): 1491-1500. Illus. 1973.

Descriptors: Lakes, *Canada, *Thermal stratification, Eutrophication, *Thermocline, Epilimnion, *Diffusion, Eddies, Water pollution sources, Pollutant identification.
Identifiers: *Eddy diffusion, Radon method.

Values of K, the coefficient of vertical eddy diffusion in the thermocline of lake 227, a small, highly stratified, and artificially eutrophied lake in northwestern Ontario, Canada, are presented. Three methods: the classical temperature method of McEwen, a dye method and a new method using a Ragapos (Randon Gas Point Source), were used. Results ranged from 2 x 10-4 cm2/s by the Rn method to 34 x 10-4 cm2/s by temperature method; the dye method resulted in an average value of 12 x 10-4 cm2/s. The recycling of &CO2 resulting from particulate degradation below the epilimnion was calculated. The results ranged from 8-53% of the net loss of C from the epilimnion depending on the K value used. Results from the Rn method are considered more accurate than results from the temperature method.--Copyright 1974, Biological Abstracts, Inc.
W76-04082

HEAVY METAL POLLUTION IN THE SEDIMENTS OF THE COEUR D'ALENE RIVER DELTA,
Idaho Univ., Moscow. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W76-04091

PHYSICAL AND CHEMICAL CHARACTERISTICS OF GREAT BEAR LAKE, NORTHWEST TERRITORIES,
Fisheries and Marine Service, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 2H.
W76-04095

NITROGEN MOVEMENT IN A SHALLOW AQUIFER SYSTEM OF THE NORTH CAROLINA COASTAL PLAIN,
Soil Conservation Service, Raleigh, N. C.
R. B. Daniels, J. W. Gilliam, E. E. Gamble, and R. W. Skaggs.
Water Resources Bulletin, Vol. 11, No. 6, p 1121-1130, December 1975. 4 fig, 1 tab, 3 ref.

Descriptors: *Nitrogen, Movement, *Aquifers, *Coastal plains, Water pollution, *Waste water disposal, *North Carolina, *Path of pollutants, Aquicludes, Groundwater, Porous media, Water table aquifers, Nitrates, Ammonium salts, Nitrites, Chemical wastes, Water pollution sources, Flow, Migration, Waste disposal, Waste storage, Industrial wastes, Groundwater movement.
Identifiers: *Shallow aquifers, Waste ponds, Chowan River(NC).

Concentrations of ammonium- and nitrate-nitrogen of about 10,000 ppm moved from an untreated surface storage pond into the groundwater in the sandy beds of the surficial sediments in northeastern North Carolina. This high concentration of nitrogen moved through the permeable sandy beds with the groundwater above the Yorktown Formation aquiclude to the Chowan River with only minor dispersion normal to the hydraulic gradient. There was essentially no nitrogen movement into the Yorktown aquiclude even though solutions of 2,000 ppm (soil basis) had been in the overlying sediments for 2 to 3 years. The possibility of the nitrogen moving into the deeper aquifers used for community water supplies is very small. Only the shallow groundwater above the Yorktown Formation in the immediate area will be contaminated with nitrogen because there is little lateral dispersion away from the flow of groundwater toward the Chowan River. (Sanderson-ISWS)
W76-04099

QUALITY OF WATER DISCHARGED FROM AN URBAN MOTORWAY,
Severn-Trent Water Authority, Birmingham (England). Dept. of Operations.
G. Hedley, and J. C. Lockley.
Water Pollution Control, Vol 74, No 6, p 659-674, 1975. 13 fig, 4 tab, 8 ref.

Descriptors: *Water pollution sources, *Highways, *Surface runoff, *Highway icing, *Corrosion, *Suspended load, *Dissolved solids, Water pollution, Storm runoff, Runoff, Surface drainage, Snow management, Snow removal, Snowmelt, Deicers, Snow, Ice, Sleet, Slush, Saline water, Pollutant identification, Path of pollutants.
Identifiers: Salting operations, Runoff quality, Aston Expressway(England), Highway deterioration, Motor vehicle emissions.

A twelve-month investigation into the quality of surface runoff from a section of the seven-lane Asteon Expressway was conducted in an attempt to determine sources of excess pollution loadings and to relate the findings to road management techniques, notably salting for hazard reduction. Runoff samples were analyzed for chlorion, total and volatile suspended solids, iron, copper, zinc, lead, nickel, cadmium, and chromium. Both concentrations and total loadings of all parameters showed definite peaks during winter months. Chlorion, nickel, and chromium loadings were further shown to be directly dependent on the quantity of salt spread on the road. Other metals and solids loadings were traced to sources such as motor vehicle corrosion and emissions, breakdown of road surface, and atmospheric fallout. It was pointed out that the use of salt on roads contributes greatly to corrosion of vehicles and may influence deterioration of the road surface as well. (Bender-ISWS)
W76-04104

COLORADO RIVER BACTERIOLOGICAL SURVEY: PARKER STRIP AND LAKE HAVASU, MAY 25-29, 1973,
Environmental Protection Agency, San Francisco, Calif. Region IX; and Environmental Protection Agency, San Franscisco, Calif. Surveillance and Analysis Div.
K. G. Shimmin, and W. H. Shafer, Jr.
Report No EPA-909/9-73-002, 1973. 38 p, 11 fig, 4 tab, 2 append.

Descriptors: *Coliforms, *Colorado River, *Public health, *Water pollution sources, *Environmental sanitation, *Arizona, *California, Salmonella, Pathogenic bacteria, Septic tanks, Cesspools, Domestic wastes, Sewage disposal, Surface drainage, Sewage effluents, Treatment, Sewage treatment, Drainage, Recreation facilities, On-site investigations, Water pollution.
Identifiers: *Bacteriological survey, Health hazard, Parker Strip(Ariz), Lake Havasu(Ariz), Crazy Horse State Park(Ariz), Fecal coliform, Leach fields, Chemical toilets.

A bacteriological survey of the Parker Strip - Lake Havasu areas of the Colorado River was conducted jointly by the State of Arizona and the Environmental Protection Agency, Region IX, during the Memorial Day weekend, May 25-29, 1973. Results of the study showed that fecal coliform counts exceeded the levels recommended for primary contact recreation water at Blue Water Marina and Buckskin Mountain State Park. Dis-

ease-causing bacteria (Arizona group, Salmonellae) were recovered from the River in the vicinity of the pipe carrying effluent from the Buckskin treatment plant. A photograph showed people swimming and playing next to this effluent pipe. Photographic evidence documented ponding of liquid over the septic tank leach fields during a peak-use period at Crazy Horse State Park. The public has easy access to this area. A description of the analytical procedures used in the study was included. (Henley-ISWS)
W76-04108

MODELLING WATER QUALITY,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
E. M. O'Loughlin.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 337-355, 3 fig, 1 tab, 40 ref.

Descriptors: *Reviews, *Model studies, *Water quality, *Dissolved oxygen, *Eutrophication, *Adsorption, Ecosystems, Plankton, Phosphorus compounds, Sediments, Biochemical oxygen demand, Nutrients, Water pollution effects.

It is sometimes considered that water quality problems ideally require that the complete aquatic ecosystem be modelled; however, judicious choices of variables and processes can often be made which allow the system quality variables to be studied in separate compartments. Examples discussed are the dissolved oxygen - organic waste model and the nutrient - plankton model for eutrophication studies. Some remarks are also given on modelling applications involving adsorption-desorption phenomena (such as phosphorus equilibria between water and sediment). (See also W76-04128) (CSIRO)
W76-04143

SOME COMPONENTS OF AN ECOSYSTEM MODEL OF WESTERNPORT BAY,
Melbourne Univ., Parkville (Australia). Centre for Environmental Studies.
W. T. O'Brien, and J. B. Hinwood.
Proceedings of the Royal Society of Victoria, Volume 87, Part 1, p 79-87, August 1975. 6 fig, 6 ref.

Descriptors: *Bays, *Water circulation, *Path of pollutants, *Australia, Tides, Computer models, Ecosystems, Waste disposal, Water quality, *Model studies.
Identifiers: *Westernport Bay(Vic).

A Water Quality Model of Westernport Bay in southern Victoria, Australia, is being developed as a first step towards a total ecosystem model of the Bay. The present structure of the model is described, some preliminary results of its use are presented, and proposals for future extension and application of the model are discussed. The intention of the model is to predict pollutant levels in the bay waters resulting from a given waste disposal strategy in the area. Tests on the hydrodynamic and pollutant transport components have revealed good agreement between predicted and observed tidal heights and velocities, and yield some previously unsuspected transport patterns which require further field measurements for verification. (CSIRO)
W76-04148

PROGRAM FRONT, TWO - DIMENSIONAL SIMULATION OF A MOVING INTRUSION FRONT IN A THIN HORIZONTAL CONFINED AQUIFER,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04172

MONITORING OF EFFLUENT STREAMS.
For primary bibliographic entry see Field 5A.
W76-04187

AN EVALUATION OF SQUOXIN ON INSECT DRIFT,
Idaho Univ., Moscow. Dept. of Entomology.
For primary bibliographic entry see Field 5A.
W76-04206

GAS-EXCHANGE RATES IN A MALL LAKE AS DETERMINED BY THE RADON METHOD,
S. Emerson, W. Broecker, and D. W. Schindler.
J Fih Res Board Can, 30(10): 1475-1484, 1973.

Descriptors: *Pollutant identification, Lakes, Canada, Algae, Boundary layers, *Carbon dioxide, Gases, Radium radioisotopes, Fertilization, Nitrogen, Phosphorus.
Identifiers: *Radon method, *Gas-exchange rate(Lakes).

The Rn method, used previously in ocean-atmosphere systems, is used to determine the gas-exchange ate between the atmosphere and lake 27 of the Experimental Lakes Area (Canada). Fertilization of the lake with N and P caused the carbon dioxide partial pressure in the lake water to drop below atmospheric levels; hence, in order to better understand the carbon budget of the lake, an estimate of the CO2 gas-exchange rate was necessary. To determine gas-exchange rates by measuring Rn evasion to the atmosphere the source of Rn in the lake water must be dissolved Ra. Since the Rn concentration in lakes derives not only from the decay of dissolved Ra but also from the inflow of Rn-rich groundwaters, Ra was added to the lake to increase the Rn concentration well above this fluctuating background level. Although this procedure was complicated by algal uptake of the Ra in the lake, we were able to place limits on the gas-exchange rate. The 'stagnant boundary layer' thickness is approximately 300 microns. This value is among te largest observed in natural waters. Using this value and the partial pressure of CO2 in th lake watr, an invasion rate of 17 plus or minus 8 mmoles CO2/m2 day was calculated.--Copyright 1974, Biological Abstracts, Inc.
W76-04219

IRRIGATION RETURN FLOW, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 585, $7.75 in paper copy, $2.25 in microfiche. Water Resources Scientific Information Center Report OWRT/WRSIC 75-209, December 1975, 207 p.

Descriptors: *Return flow, *Irrigation practices, *Salinity, *Bibliographies, Path of pollutants, Nitrates, Water quality, Water pollution, Irrigation efficiency, *Irrigation effects.

This report, containing 132 abstracts, is another in a series of planned bibliographies in water resources produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 89,737 abstracts covering SWRA through October 15, 1975 (Volume 8, Number 20). Author and subject indexes are included. (OWRT)
W76-04230

A STUDY OF OXYGEN-NITROGEN BALANCE IN WATERBLOOM OUTBREAKS,
East Tennessee State Univ., Johnson City. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W76-04234

PLANKTON MICRO-FOSSILS AS INDICATORS OF PALEOTROPHIC DYNAMISM IN FLATHEAD LAKE,
Montana Univ., Missoula.
For primary bibliographic entry see Field 5C.
W76-04235

HEAVY METALS IN AGRICULTURAL LANDS RECEIVING CHEMICAL SEWAGE SLUDGES, VOLUME II,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W76-04244

THE BOD'S AND TOXICITY OF EFFLUENTS FROM SULPHITE PULPING FOR NEWSPRINT,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
For primary bibliographic entry see Field 5C.
W76-04245

STUDY OF THE WASTE CHARACTERISTICS OF FISH PROCESSING PLANTS, LOCATED IN THE MARITIME REGION,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
K. T. Brodersen.
Economic and Technical Review Report EPS 3-WP-73-7, Environmental Protection Service, Environment Canada, Ottawa, Canada, December, 1973, 77 p, 6 fig, 33 tab, 3 ref.

Descriptors: *Wastes, *Fish, Herrings, Shellfish, Water types, Biological membranes, Suspended solids, Water utilization, Biochemical Oxygen Demand, *Industrial wastes, Water pollution sources, Waste water treatment.
Identifiers: *Fish processing plants, Groundfish, Maritimes, Fish meal.

Fish processing plants located in Shippegan, Caraquet, and Lameque region of the Province of New Brunswick, were chosen for a study to determine the waste characteristics of the fish processing industry. The effluent sampling and analyses program characterizes waste from 8 plants processing groundfish, shellfish, combined groundfish and shellfish, herring, and fish meal. Waste flows and plant production figures were incorporated with the waste paramater BOD5, suspended solids and oil content for each type of processing plant. (Environment Canada)
W76-04252

EFFECT OF EFFLUENT FROM BEEF FEEDLOTS ON THE PHYSICAL AND CHEMICAL PROPERTIES OF SOIL,
Nebraska Univ. Lincoln Dept. of Agronomy.
D. G. Hinrichs, A. P. Mazurak, and N. P. Swanson.
Soil Science Proceedings, Vol 38, No 4, p 661-663, July/August, 1974. 6 tab, 11 ref.

Descriptors: *Feed lots, *Agricultural runoff, Effluents, *Soil chemical properties, *Soil physical properties, Irrigation, Hydraulics, Wate pollution effects, Waste disposal, Precipitation(Atmospheric), *Path of pollutants.
Identifiers: Land application, Beef feedlot runoff.

The effects on soil physical properties of using beef feedlot effluent as irrigation water was studied. Effluent from beef feedlots was applied as irrigation to silty clay loam soil in eastern Nebraska over a two year period. Soil samples from 0 to 2 cm depth were collected at three locations before, during, and after each growing season. The effluent applications caused no significant differences in the soil bulk density, the geometric mean diameter of water-stable aggregates, the water-retention characteristics, or size distribution of the particles in the soil. However, the hydraulic conductivities of disturbed soil samples showed

significant differences. A decrease in hydraulic conductivity for the effluent-treated areas was noted, probably associated with the dispersion of the soil by the sodium, ammonia, and potassium in the effluent. A decrease in the permeability and an increase in the salt content of the soil caused by the application of the effluent were largely negated by precipitation during the off-irrigation season. It was concluded that the application of 2.5 and 5.0 cm of effluent each week during the growing season caused no deterioration of the physical conditon of the soil. (Orr-FIRL)
W76-04289

METAL CONTENTS OF LAKE SEDIMENT CORES FROM ESTABLISHED MINING AREAS: AN INTERFACE OF EXPLORATION AND ENVIRONMENTAL GEOCHEMISTRY,
Geological Survey of Canada Ottawa, (Ontario). Resource Geophysics and Geochemistry Div.
R. J. Allan.
Geological Survey of Canada, Paper 74-1, Part B, p 43-49, March, 1974.

Descriptors: Waste water treatment, *Industrial wastes, *Mining, *Metals, Sediments, Water pollution sources, Environmental effects, *Lake sediments, Lakes, Canada, Geochemistry, Pollutant identification.

Sample sediments from lakes in three mining areas of the southern Canadian shield showed the effects of pollution from the mining industry. Environmental contamination from mining operations may be caused by tailings introduced as solids into drainage systems, leachates from onshore tailing piles, effluents from mines or mining plants, or airborne particles from crushers and smelters. Sample cores were taken and analyzed. These illustrated the variation between original pre-mining metal concentrations and present-day concentrations. The effects seem to be limited to the surface few centimeters, and are quite variable. (Kramer-FIRL)
W76-04291

TWO-DIMENSIONAL MASS DISPERSION IN RIVERS,
Colorado State Univ., Fort Collins.
F. M. Holly, Jr.
Hydrology Papers, No 78, September 1975. 67 p, 42 fig, 12 tab, 40 ref, 5 append.

Descriptors: *Dispersion, *Computer models, *Diffusivity, *Water pollution, *Laboratory tests, Rivers, Mathematical studies, Fluid mechanics, Boundary processes, Turbulence, Liquid wastes, Model studies, Mixing, *Path of pollutants.
Identifiers: *Finite difference method, *Missouri River(Iowa), *Clinch River(Va), Transverse diffusivity, Bed shear.

The objective of this research was to develop an efficient computational model for the prediction of time-dependent mass dispersion in natural streams by using the results of transverse diffusivity in laboratory channels. The computational model was a partial differential equation expressing conservation of pollutant mass in a control volume. The computational model developed was based on a finite-difference solution to the depth-averaged dispersion equation, for predicting concentrations resulting from a pollutant source of arbitrary time and space configuration in a stream of any geometry with non-uniform steady flow. Problems of numerical instability and damping in the convective stage of the computation were avoided through the use of a half-implicit and half-implicit second order differencing scheme for the space derivative. The result was a model which was unconditionally stable with accuracy not dependent on the time and distance steps. The triangular-channel tests performed indicated that the transverse diffusivity is constant within a cross section. This suggested an interaction between bed shear and transverse shear. The applicability of the model was demonstrated through simulation of dispersion experiments for the Missouri River and Clinch River. (Singh-ISWS)
W76-04309

DISPERSION OF MASS IN OPEN-CHANNEL FLOW,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2J.
W76-04311

GUIDELINES ON SAMPLING AND STATISTICAL METHODOLOGIES FOR AMBIENT PESTICIDE MONITORING.
Federal Working Group on Pest Management, Washington, D.C.
For primary bibliographic entry see Field 5A.
W76-04315

ESTUARY STUDIES,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs.
H. W. Jackson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 482, $5.75 in paper copy, $2.25 in microfiche. Manual 161.3, September 1972. 151 p, 36 fig, 13 tab, 180 ref.

Descriptors: *Estuaries, *Estuarine environment, *Environment, *Education, *Training, Chemistry, Geology, Pollutants, *Water pollution, Biology, Estuarine fisheries, Bioindicators, Pollutant identification, Aquatic environment, Aquatic life, Bioassay, Benthos.

This manual consists of a collection of expanded basic outlines that deal with the estuarine environment. The reference outlines were selected and developed to provide the student enrolled in scheduled training courses of the Office of Water Programs, Environmental Protection Agency, with a fund of the best available current information pertinent to the subject matter of the course. Individual instructors may provide additional material to cover special aspects of their own presentations. This manual will be useful to anyone who has need for information on the subjects covered. However, it should be understood that the manual will have its greatest value as an adjunct to classroom presentations. (Sims-ISWS)
W76-04319

A DISPERSION CURVE STUDY OF MODEL DREDGE SPOIL BASINS,
Texas A and M Univ., College Station. Dept. of Civil Engineering; and Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
R. Male, and D. R. Basco.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-75-10329, $6.75 in paper copy, $2.25 in microfiche. Texas A and M University Civil Engineering Department Sea Grant College Publication, TAMU-SG-75-201, and C.D.S. Report No 180, September 1974. 139 p, 58 fig, 14 tab, 20 ref, 6 append. NOAA 04-3-158-18.

Descriptors: *Dredging, *Spoil banks, Basins, *Dispersion, Water quality standards, *Settling basins, Effluents, Tracers, Baffles, Dyes, Dikes, Computer programs, Sediment transport, Model studies, Sediments, Waste disposal, Variability, Intakes.
Identifiers: *Spoil basins, Dispersion curve, Tracer testing, Baffle box, Settling tanks, Spoil basin inlets, Log normal function.

Settling tank theory and tracer testing techniques were used to compare a plain pipe inlet, various baffled inlet designs, and a reaction-jet inlet in a model spoil basin. Methods were developed to use the dye tracing technique with the tank effluent being recycled. Baffling improved the tank performance over the uncontrolled condition. A single baffle centrally placed in front of the inlet proved to be better than: (1) the same baffle with collinear baffles on each side, (2) a baffle box, and (3) a reaction-jet plate on the inlet pipe. Increasing the water depth also yielded significant improvements in behavior. The results of this study indicated that basin performance can be appreciably improved by constructing a short dike across the path of the influent and by keeping the water depth at a maximum. Field testing was recommended to determine dispersion curves under various conditions in the basin. A method was shown to calculate sediment removal from the interaction of dispersion curves with a quiescent column settling area. (Roberts-ISWS)
W76-04321

THE NEEDS FOR WATER QUALITY MODELS ON AGRICULTURAL WATERSHEDS,
Southeast Environmental Research Lab., Athens, Ga.
H. P. Nicholson.
Journal of Environmental Quality, Vol. 4, No. 1, p 21-23, (Jan.-March 1975). 3 p, 6 ref.

Descriptors: *Path of pollutants, *Watersheds(Basins), *Federal Water Pollution Control Act, *Agricultural runoff, *Agricultural chemicals, *Mathematical models, Data processing, Water pollution sources, Sedimentation, Soil erosion, Surface runoff, Fertilizers, Animal wastes, Treatment, Grants, Government finance, Mathematical studies.
Identifiers: Federal Water Pollution Control Act(FWPCA) Amendments of 1972, *Nonpoint sources(Pollution).

Agricultural practices are now accounting for approximately one-half of the sediment pollution in the United States. The Federal Water Pollution Control Act Amendments of 1972, recognizing the effect such pollution was having on overall water quality, encouraged states to establish management programs to control nonpoint sources of pollution. Under the 1972 Amendments, state programs may receive federal funding and will be eligible for grants to develop new methods for controlling agricultural pollution. Most agricultural pollution cannot be controlled by standard collection and treatment systems; however, federal funding could stimulate the development of mathematical formulas which would allow the use of computer technology in gathering and analyzing data concerning agricultural pollution. Any successful management program developed will have to provide techniques for controlling soil erosion, as well as for controlling the runoff of fertilizer wastes into the country's waterways. The program will also have to provide methods for retaining plant residues and animal wastes on the land. In order to accomplish these diverse goals, management prgrams should be planned for entire drainage basins. (Hoffman-Florida)
W76-04353

PRELIMINARY INVESTIGATION OF GROUND-WATER QUALITY AND ITS EFFECT ON SUBURBAN DEVELOPMENT IN WASHOE VALLEY, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5A.
W76-04386

BIOTIC CHANGES IN THE WILLIMANTIC/SHETUCKET RIVER ASSOCIATED WITH IMPROVEMENTS IN SEWAGE TREATMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W76-04388

EFFECTS OF A LANDFILL OPERATION ON GROUND-WATER QUALITY IN NORTH BROWARD COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
W. A. J. Pitt, Jr.
Open-file report 75-405, 1975. 48 p, 5 fig, 2 tab, 9 ref.

Descriptors: *Florida, *Water pollution sources, *Groundwater, *Landfills, *Waste dumps, *Path of pollutants, Water analysis, Water quality, Chemical analysis, Leachate, Organic wastes, Sludge, Inorganic compounds, Data collections.
Identifiers: Broward County(Fla).

The quality of the shallow groundwater underlying a landfill in north Broward County, Florida is affected by leachates from landfill materials. Water samples from shallow wells in the landfill and downgradient from it show that there are definite changes in the water quality in the shallow part (0-20 feet or 0-6 metres) of the aquifer as reflected by changes in concentration of most of the water-quality parameters studied, but at the 90-foot (27-metre) depth the changes are not so pronounced. The sludge disposal operation appears to be the major cause of concern. The concentration of most of the constituents associated with organic leachate from the sludge decreased very little and in some cases not at all as the groundwater moved 60 feet (18 metres) downgradient of the landfill, while other constituents and characteristics such as turbidity, sulfate, flouride, arsenic, detergents, oil and grease, and phosphate generally decreased in concentration in that same distance. (Woodard-USGS)
W76-04404

COCKEYSVILLE QUADRANGLE: GEOLOGY, HYDROLOGY AND MINERAL RESOURCES,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 7C.
W76-04407

UNITED STATES GEOLOGICAL SURVEY'S HYDROGEOLOGICAL RESEARCH PROGRAMS AND PLANS RELATED TO DISPOSAL OF RADIOACTIVE WASTE INTO GEOLOGIC FORMATIONS,
Geological Survey, Reston, Va.
G. D. DeBuchananne, and W. S. Twenhofel.
Open-file report 75-626, November 1975. 23 p, 53 ref.

Descriptors: *Radioactive waste disposal, *Underground, *Solid wastes, *Path of pollutants, *Groundwater movement, Aquifers, Reviews, Projects, Model studies, Hydrogeology, Planning, Evaluation, Geologic formations.
Identifiers: *Radioactive waste migration.

The U.S. Geological Survey has cooperated with the United States Energy Research and Development Administration, formerly the Atomic Energy Commission, for more than 30 years on research related to the disposal of radioactive waste into geological formations. As a part of its own research program, the U.S. Geological Survey has initiated geochemical and digital model studies of waste transport at four of its research centers. At the same time field studies on the hydrogeology of four state owned low-level radioactive solid waste burial grounds are being made to provide the field observations of waste migration needed to test the theoretical and laboratory approaches. Hydrogeological criteria will be developed for use in the selection of future radioactive waste disposal sites. These programs are described. (Woodard-USGS)
W76-04411

LIVESTOCK FEEDLOTS ARE POLLUTION SOURCE,
P. Bosley.
Medical Bulletin of the University of Minnesota, p 3-6, March-April, 1971. 2 fig.

Descriptors: *Farm wastes, *Livestock, Waste disposal, *Feed lots, *Water pollution sources, *Minnesota, Biochemical oxygen demand, Nitrates, Sewage, Coliforms, Regulation, Water pollution control.

The discharge of animal and human waste into Minnesota lakes and rivers is a serious pollution hazard. Many farmers have dug a direct connection to rivers, streams, and lakes, piled excess manure on the edge of lakes, allowed their animals to defecate on frozen lakes, and left dead animals on riverbanks and in lakes. Lake Yankton is used as a cesspool for the community of Balaton. County ditches, which collect wastes and run into rivers, are ubiquitous. County Ditch 29 had a massive B Coli count, and a toxic nitrate level of 17 at its start. The Minnesota Pollution Control Agency (PCA) is taking no action on this, and has forgotten the January, 1971, deadline imposed on the community of Ruthton to submit detailed plans for a sewage treatment system. The Redwood River (before the community of Marshall with a population of 10,000 empties its uncreated sewage into it) has a B Coli count of 110,000 per 100 ml, while the accepted norm is 1,000 per ml. The BOD is over 30. Enforcement of regulations must be stricter, farmers must improve their feedlots, and sewage treatment facilities must be built. (East Central University)
W76-04413

A PERSPECTIVE FOR CONNECTICUT,
Connecticut Univ., Storrs.
J. J. Kolega.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p 44-48.

Descriptors: *Farm wastes, *Connecticut, *Poultry, *Dairy industry, Agricultural runoff, Odor, Water pollution, Septic tanks, Research and development, Waste disposal.
Identifiers: *Waste management, Horses.

Agricultural waste problems in Connecticut are primarily those associated with the poultry and dairy industry. Prime problems for the dairy industry are surface runoff from paved areas; surface discharges into streams or into a drinking water supply watershed, and milking center discharges. The poultry producer's problems are even more serious due to the small amount of land accomodating his operations and due to the corresponding population growth around these operations. The major complaints against the poultry producer have been directed toward the odors emanating from his facilities. Another problem requiring attention in Connecticut is the handling of septic tank pumpings. About two-thirds of Connecticut's geographic area is estimated to be using septic-tank disposal systems or their equivalent. University of Connecticut studies related to these three problem areas are listed. A relatively new problem area developing in Connecticut is related to the influx of pleasure horses. A general recommendation handling of the wastes from these animals has not yet been developed. (Merryman-East Central)
W76-04417

FEEDLOT WASTE DISPOSAL AND WATER POLLUTION,
Colorado State Univ., Fort Collins. Agricultural Extension Service.
R. Hansen.
AE70-71RWHl, Colorado State University, 5 p, 1 tab.

Descriptors: *Farm wastes, *Waste disposal, *Feed lots, *Agricultural runoff, *Water pollution, Lagoons, *Settling basins, Waste treatment, *Aerated lagoons.
Identifiers: Land disposal, Detention ponds, Settling channels.

The principal sources of pollution from feedlot wastes are organic substances, volatile substances, inorganic substances, pathogens, and insects harbored by the waste material. While the constituents of manure are especially a problem if allowed to reach bodies of water, the nutrient content of manure makes it a valuable fertilizer material. One of the major pollution problems of feedlot wastes is agricultural runoff. Studies have indicated that the runoff water can be collected and disposed of by several methods. Options include retention ponds, lagoons, settling basins, settling channels, and land disposal. Biological treatment systems can be used, but it is difficult to operate them satisfactorily with the intermittent flows usually encountered in runoff collection systems. Although the likelihood of groundwater pollution from feedlots seems small, very little information is available on this subject. (Penrod-East Central)
W76-04419

AGRICULTURE AND NATURE'S NUTRIENT CYCLES,
Fertilizer Inst., Washington, D. C.
For primary bibliographic entry see Field 5C.
W76-04422

CATTLE FEEDLOT WASTEWATER SALINITY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W76-04429

FECAL COLIFORM POLLUTION IN AN AGRICULTURAL ENVIRONMENT,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
J. K. Jones.
M. S. Thesis, 1971, 122 p, 7 fig, 10 tab, 84 ref.

Descriptors: *Farm wastes, *Water pollution, *Agricultural runoff, *Feed lots, Livestock, *Coliforms, Ammonia, Nitrogen, Biochemical oxygen demand, Bivindicator, Pollutant identification, Path of pollutants.
Identifiers: Membrane filter method.

A study was undertaken with the primary objective of characterizing the types and numbers of coliform organisms occurring in fresh and stored livestock fecal wastes and in waters polluted by these wastes. A membrane filter procedure was used to detect the total coliform and fecal coliform groups and these groups were used to examine the significance of the organisms as indicators of livestock waste pollution. Fresh bovine, ovine and equine fecal samples showed an overall range of total coliform counts of 7400 to 65 million per gram dry weight and of fecal coliform counts, 5800 to 60 million per gram. In an environment of stored bovine manure, a reduction in numbers of coliforms occurs. Complex interactions of the coliform population with the natural environment determine the types and numbers of indicator organisms that reach water supplies in runoff from a livestock rearing area. The ammonia nitrogen concentration and biochemical oxygen demand may be at very low levels even when coliform counts indicate that water pollution by runoff is occurring. The detection of fecal coliforms by the membrane filter FC test in waters polluted mainly by fecal wastes can be good; 95.2 percent of 733 FC positive colonies from water samples were confirmed as Escherichia IMViC types I or II. (Cartmell-East Central)
W76-04432

5C. Effects Of Pollution

UPTAKE AND DISTRIBUTION OF TRACE METALS IN FISH,
Purdue Univ., Lafayette, Ind. Dept. of Bionucleonics.

G. J. Atchison.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 496, $4.00 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center, Technical Report No 73, December 1975. 21 p, 3 fig, 11 tab, 24 ref. OWRT A-038-IND(1).

Descriptors: *Cadmium, *Chromium, *Fish physiology, Heavy metals, *Shiners, *Bass, Water pollution sources, *Sunfishes, *Absorption, Trace elements, Indiana, Lakes, Eutrophication, Industrial wastes, Spectrophotometry, *Metals, Pollutant identification.
Identifiers: Palestine Lake(Ind), Metal plating wastes.

Palestine Lake, near Warsaw, Indiana, is eutrophic and has for many years received wastes containing cadmium and chromium from a nearby metal plating shop. No effects of the effluent on fish distribution were found using electrofishing catch per unit effort analysis. Bluegill (Lepomis macrochirus) and largemouth bass (Micropterus salmoides) were analyzed for cadmium and chromium using a nitric acid-perchloric acid wet digestion followed by atomic absorption spectrophotometry for quantitation. Muscle, gill, liver, and gastrointestinal tract were analyzed. Whole body samples of golden shiners (Noremigonus crysoleucas) were also analyzed. Due to the small dry weights of the samples being studied and the relative insensitivity of the methods, no difference was noted among the three different species, the four samples sites in the lake, or the several age classes of largemouth bass represented in the samples. Concentrations reported here are, however, above most of those reported in the literature.
W76-04010

STUDIES ON THE EFFECTS OF THERMAL ADDITIONS ON SELECTED ZOOPLANKTON POPULATIONS,
Minnesota Univ., Duluth. School of Medicine.
W. R. Swain, R. M. Wilson, and R. P. Neri.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 497, $5.00 in paper copy, $2.25 in microfiche. Water Resources Research Center, St. Paul, Bulletin No 84, Nov 1975. 85 p, 45 fig, 8 tab, 45 ref. OWRT B-097-MINN(2).

Descriptors: *Thermal pollution, *Zooplankton, *Lake Superior, Benthos, Algae, Minnesota, Water pollution effects, *Remote sensing, Bioindicators, Measurement.

The objective was to examine the effects of calefaction upon members of the animal portion of the Lake Superior ecosystem. Additionally, certain species which are widely available were also utilized in order to establish a point of reference which could be used by workers in other parts of the country. The conventional approach to a problem of this sort has been to measure the effects of an effluent source on a specific community and attempt to understand the ecological interrelationships of the altered environment. The method described here utilized the establishment of an artificial segment of Lake Superior in a carefully controlled laboratory setting which could be modified at will in order to observe the impacts of each change upon the test organism or community. Critical to this study was a method of observation of organism behavior which allowed remote monitoring of the population, but did not alter the environment of the test animals. Such a method was developed and is described. This method enabled measurement of critical physiological and behavioral responses which provided a baseline for work with thermal additions. (Waelti-Minnesota)
W76-04012

THE EFFECT OF THE GOSHEN BAY DIKE ON THE BENTHOS OF UTAH LAKE IN RELATION TO WATER QUALITY,
Brigham Young Univ., Provo, Utah. Dept. of Zoology.
J. R. Barnes, T. W. Toole, D. L. Tillman, and D. K. Shiozawa.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 553, $5.00 in paper copy, $2.25 in microfiche. Final Report, (1974). 93 p, 31 fig, 25 tab, 33 ref. OWRT A-012-UTAH(1). 14-31-0001-3845.

Descriptors: Aquatic animals, *Benthos, *Utah, Dikes, *Benthic fauna, *Benthic flora, Aquatic populations, Aquatic habitats, Reservoirs, Aquatic productivity, Lakes, Saline lakes, Lake morphology, Diptera, *Littoral, Invertebrates, *Standing crops, *Pre-impoundment.
Identifiers: Goshen Bay(Utah), Utah Lake(Utah), Macroinvertebrates.

As part of the Bonneville Unit of the Central Utah Project the southern one third of Utah Lake will be diked off. This area consists of two major macroinvertebrate habitats, a rocky shore litoral zone along the eastern shore and the silty clay region which makes up most of the area. Cement artificial substrate samplers were used to sample the littoral zone and an Ekman dredge and KB corer were used in the silty clay region. In the littoral zone an amphipod and a chironomid were the dominant organisms in numbers and biomass. Only two taxa, chironomids and oligochaetes, were collected from the silty clay area. The standing crop estimates for both areas shows that both are highly productive and, in part, play an important role in supporting the fishery of Utah Lake. The littoral zone, based only on biomass values for the two dominant species, ranks among the top ten richest lakes in the United States in macroinvertebrate standing crop values. The littoral zone undoubtedly plays an important role in determining the water quality and rate of eutrophication in part of the lake. When the dike is constructed the littoral area that will be eliminated should be duplicated on the inside of the dike.
W76-04013

OXIDATION OF LAKE AND IMPOUNDMENT HYPOLIMNIA,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
W. Whipple, Jr., J. V. Hunter, F. B. Trama, and T. J. Tuffey.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 500, $5.00 in paper copy, $2.25 in microfiche. Completion Report, October 1975. 87 p, 31 fig, 14 tab, 5 ref, 2 append. OWRT B-050-NJ(2), B-058-NJ(1). 14-31-0001-5091, 14-31-0001-3913.

Descriptors: *Hypolimnion, *Oxygenation, *Water quality, Water chemistry, *Phosphates, *Lakes, Biochemical oxygen demand, Nutrients, Phytoplankton, Benthic fauna, *Eutrophication, *New Jersey, Reservoirs, *Oxidation, Dissolved oxygen.
Identifiers: Spruce Run Reservoir(NJ), Oxygenators.

Research to determine the effect of oxygenation on the hypolimnia of eutrophic lakes was carried out at Spruce Run Reservoir in New Jersey. A new type of oxygenator was utilized which dissolves oxygen into the lower depths of the lake, in water masses directed horizontally in slow but turbulent currents, which do not disturb stratification. The apparatus uses liquid oxygen, and fine pore diffusers. The efficiency of the operation was less than anticipated; but sufficient oxygen was introduced to maintain trout and alewives during the summer season. It was hoped that the maintenance of aerobic conditions would interrupt the eutrophication process in the lake by retarding the solution of phosphorus in the bottom sediments. However, in this lake it appears that the phosphorus content is determined primarily by physical conditions and storm runoff from tributaries; and therefore could not be affected by the oxygenation process. Biological surveys were made; no significant differences were found between the test arm and the control arm of the lake, either as regards phytoplankton or bottom fauna.
W76-04016

HYDROLOGIC DATA SUMMARY: CLEARWATER RIVER BASIN, WATER YEAR 1973-1974,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 4C.
W76-04019

AQUATIC SURVEY OF SELECTED STREAMS WITH CRITICAL HABITATS ON NATIONAL RESOURCES LANDS AFFECTED BY LIVESTOCK AND RECREATION,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
For primary bibliographic entry see Field 4C.
W76-04042

CADMIUM-INDUCED HISTOPATHOLOGICAL CHANGES IN GOLDFISH,
R. Tafanelli, and R. C. Summerfelt.
In: The Pathology of Fishes, Ribelin, W E and G Migaki, eds. The University of Wisconsin Press, Madison, Wisconsin, 1975. Chap 25, p 613-645, 8 fig, 5 tab, 56 ref.

Descriptors: Water pollution sources, *Public health, *Toxicity, Gonads, *Fish diseases, *Bioassay, *Cadmium, *Lethal limit, Analytical techniques, *Microscopy, *Path of pollutants, *Metals, *Reproduction, *Water pollution effects, Food webs, Laboratory tests, Toxicants, Industrial wastes.
Identifiers: Tissue analysis, LD50, Sublethal effects, *Histopathology, Bioaccumulation, *Golfish, Kidney damage.

Cadmium is present in the environment as a contaminant as a result of production or utilization of this heavy metal in manufacturing processes. The LD50 of intraperitoneal injections of CdCl2 to the goldfish was 30.0, 23.0, and 20.0 mg/kg wet weight at 24, 48 and 96 hours, respectively. In solution, the concentration of cadmium salts lethal to fish is generally less than this, with toxicity explained by precipitation of mucoproteins on the gill epithelium and resulting in suffocation. Examination of gonadal tissue of goldfish receiving multiple injections of cadmium indicated histopathological changes including damage to germ cells and seminiferous tubules. Increased pathological changes in kidneys were observed in cadmium-injected fish. The liver had greater tolerance to cadmium than other organs did. Cadmium may have serious effects on osmoregulation, hematopoeisis and gametogenesis. Continuous exposure to sublethal doses resulted in large accumulations of residues in several organs and biological magnification through the food chain could facilitate the transfer of cadmium to man. (Katz)
W76-04043

LESIONS DUE TO DRUGS,
H-H. Reichenbach-Klinke.
In: The Pathology of Fishes, Ribelin, W E and G Migaki, eds. University of Wisconsin Press, Madison, Wisc. Chap 26, p 647-656, 1975. 11 fig, 5 ref.

Descriptors: Pesticides, *Pesticide residues, *Mercury, *Antibiotics(Pesticides), Copper sulfate, Microscopy, *Public health, Aquiculture, *Fish diseases, *Cytological studies, Inhibitation, Vitamins, Analytical techniques, Diseases, Management, Fish farming, Copper compounds, Algicides, Enzymes.

Identifiers: *Drugs, Methylene blue, Malachite green, Masoten, *Chemotherapy, Sulfonamides, Thiabendazole.

A number of common drugs were tested over a long period of time in order to evaluate cellular alterations resulting from the application of these drugs. Most drugs used in fish cultivation can lead to residues (copper, chlorinated hydrocarbons), alterations in the kidney and liver and inhibition of intestinal enzymes. The residues can be transmitted to man. It is recommended that use of these drugs, including malachite green, copper sulfate, mercurials, thiabendazole, Masoten, and sulfonamides, be considered only in urgent cases. Medicaments such as methylene blue and vitamins are suggested for use in place of drugs with cell-damaging effects. (Katz)
W76-04044

CHEMICALLY INDUCED LESIONS IN ESTUARINE OR MARINE TELEOSTS,
G. R. Gardner.
In: The Pathology of Fishes, Ribelin, W E and G Migaki, eds. University of Wisconsin Press, Chap 27, p 657-693, 1975. 30 fig, 21 ref.

Descriptors: Animal pathology, *Oil, *Fishkill, *Teleosts, Marine fish, Environmental effects, *Microscopy, *Metals, Water pollution effects, *Fish diseases, Analytical techniques, Laboratory tests, Pesticides, Copper, Silver, Zinc, Mercury, Cadmium, Effluents, Estuarine environment, Toxicity.
Identifiers: *Histology, *Menhaden, *Mummichog, Fundulus heteroclitus, Menidia menidia, Crude, Gills, Methoxychlor.

Chemically induced and spontaneous lesions in certain marine teleosts, including experimentation on the common mummichog (Fundulus heteroclitus) are discussed. Toxicity tests were conducted with cadmium, copper, mercury, silver, zinc and methoxychlor, as well as crude oil. Metals caused a heavy gill-mucus response in Fundulus. Mercury, silver and copper produced lesions in the olfactory and lateral line systems. Crude oil produced lesions in the olfactory organs of Menidia menidia. Many of the chemical wastes discharged into the aquatic environment may be exerting similar neurotoxic effects within the sensory organs of the teleost. Disablement of sensory perception in some organisms can make them much more susceptible to enemies, predation, disease and other hazards in their environment. 'Spinning' menhaden were captured and examined for lesions and anatomical change. (Katz)
W76-04045

SKELETAL ANOMALIES IN MARINE TELEOSTS,
D. W. Valentine.
In: The Pathology of Fishes, Ribelin, W E and Migaki, G, eds. University of Wisconsin Press, Madison, Wisconsin, Chap 28, p 695-718, 1975. 8 fig, 6 tab, 43 ref.

Descriptors: Deformation, *Pathology, *Bass, Fish, *Metabolism, *Calcium, *California, *Fish diseases, *Teleosts, Animal pathology, Aquatic life, Toxicants, Water polution effects, Environmental effects, Heavy metals, DDT, Pesticides.
Identifiers: Barred sand bass, Paralabrax nebulifer, *Skeletal anomalies, Gill rakers.

Barred sand bass (Paralabrax nebulifer) collected in southern California were examined internally and externally for skeletal anomalies. Observed anomalies involved gill rakers, bones of the opercular series, snubnosedness, cranial assymetries, fin anomalies and deformed vertebral columns. There was a significant difference between frequency of anomalies observed in Southern California and Baja California (control population) barred sand bass. There existed an excellent association between gill raker anomalies and both internal and external anomalies. The anomalies are apparently not congenital and increase in both frequency and severity with increasing age of the fish. The causative mechanisms producing these skeletal anomalies are unknown but may be due to metabolic interference by accumulated toxicants. (Katz)
W76-04046

BACTERIAL DEGRADATION AND EMULSIFICATION OF NO. 6 FUEL OIL,
University of Western Ontario, London. Faculty of Engineering Science.
For primary bibliographic entry see Field 5D.
W76-04060

VERTICAL EDDY DIFFUSION STUDIES IN THE THERMOCLINE OF A SMALL STRATIFIED LAKE,
For primary bibliographic entry see Field 5B.
W76-04082

AN AERIAL-PHOTOGRPHIC ANALYSIS OF THE ENVIRON'MENTAL IMPACT OF CLAY MINING IN NEW JERSEY,
Earth Satellite Corp., Washington, D.C. Geosciences and Environmental Applications Div.
For primary bibliographic entry see Field 5A.
W76-04092

ENVIRONMENTAL CONCERNS AND DECISIONS FOR THE MINING INUDSTRY,
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5G.
W76-04093

COLORADO RIVER BACTERIOLOGICAL SURVEY: PARKER STRIP AND LAKE HAVASU, MAY 25-29, 1973,
Environmental Protection Agency, San Francisco, Calif. Region IX; and Environmental Protection Agency, San Franscisco, Calif. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5B.
W76-04108

MODELLING WATER QUALITY,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
For primary bibliographic entry see Field 5B.
W76-04143

MEASUREMENT OF ADENOSINE TRIPHOSPHATE (ATP) IN TWO PRECAMBRIAN SHIELD LAKES OF NORTHWESTERN ONTARIO,
For primary bibliographic entry see Field 5A.
W76-04193

AN IN-SITU STUDY OF THE SUTRITION OF LAKE ZOOPLANKTON USING CARBON 14 AND PHOSPHOROUS 32, FLATHEAD LAKE, MONTANA,
Montana Univ., Missoula.
G. Voerman, A. Gaufin, and J. Tibbs.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 668, $4.00 in paper copy, $2.25 in microfiche. Research Report No 72, Montana University Joint Water Resources Research Center, Bozeman, December 1975. 36 p, 5 fig, 12 tab, 36 ref. OWRT A-085-MONT (1).

Descriptors: *Zooplankton, *Microorganisms, Ecosystems, Oligotrophy, *Water quality, *Montana, Nutrient requirements, Lakes, *Tracers, Phytoplankton, *Food chains, Trophic level, Aquatic populations, Bioindicators.
Identifiers: *Flathead Lake(Mont), *Lake ecosystems, *Oligotrophic lakes.

This study was undertaken to determine the state of zooplankton nutrition in Flathead Lake, Montana, using C-14 as a radiotracer. Flathead Lake continues to be one of the most oligotrophic lakes in North America. This statement is supported by both chemical and biological data from the present study. Orthophosphate levels remain well below 10 microgram/liter, phytoplankton biomass is lower in 1975 than it has been in recent history and phytoplankton and zooplankton species are still indicative of very oligotrophic conditions. Further evidence for this is provided through zooplankton grazing data which indicates that Flathead Lake is very lightly buffered by organic detritus, a situation typical of most oligotrophic lakes. Of particular interest is the accurate measurement of phosphates in Flathead Lake for the first time, making it possible to monitor previously undetectible phosphorus dynamics so the present excellent water quality of the lake can be maintained.
W76-04231

A STUDY OF OXYGEN-NITROGEN BALANCE IN WATERBLOOM OUTBREAKS,
East Tennessee State Univ., Johnson City. Dept. of Biology.
J. T. Wyatt.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 618, $3.50 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report No 46, November, 1975, 9 p, 21 ref. OWRT A-0290TENN(2). 14-31-0001-4043.

Descriptors: *Nitrogen fixation, Algae, Reaeration, *Cyanophyta, *Eutrophication, Water pollution effects, Plankton, Aquatic microorganisms, Oxygenation.
Identifiers: Nitrogenase activity, *Oxygen-nitrogen balance, Anoxic conditions, Euplankton.

The research involved laboratory and field investigations of the influence of 02:N2 relationships on nitrogenase activity (nitrogen fixation) of euplanktonic blue-green algae. Special attention was given to the linkage between 'waterbloom' potential and high nitrogenase activity as influenced by favorable 02:N2 tensions. About half of the nitrogen-fixing blue-green algal strains isolated from 'waterbloom' outbreaks exhibit nitrogenase enhancement when 02 is less than 1 mg/l and N2 is as high as 1 mg/l. Prolonged exposure (48-72 hrs.) to anoxic conditions causes precetible aberrations in experimental cells. Substantial levels of combined nitrogen in the growth medium enhance rather than depress nitrogen-fixation. Under simulated hypolimnion conditions, experiments with partial hydrogen atmospheres suggest that hydrogenase may be a prime source of electrons (Via ferredoxin) for N2 reduction. Most evidence to date still supports the proposition that 'waterblooms' do originate in the lower levels of impoundments. (Larson-Tennessee)
W76-04234

PLANKTON MICRO-FOSSILS AS INDICATORS OF PALEOTROPHIC DYNAMISM IN FLATHEAD LAKE,
Montana Univ., Missoula.
D. S. Potter, and J. F. Tibbs.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 617, $4.00 in paper copy, $2.25 in microfiche. Research Report No 54, Montana University Joint Water Resources Research Center, Bozeman, December 1975. 27 p, 1 fig, 1 tab, 23 ref. OWRT A-074-MONT(1).

Descriptors: *Rotifers, *Crustaceans, *Copepods, Plankton, Ecosystems, Zooplankton, Water quality, Biological communities, Ecology, Biota, *Montana, *Bioindicators, Lakes, Temporal distribution, Diel migration, Spatial distribution.
Identifiers: *Flathead Lake(Mont), Paleotrophic conditions.

The basic objectives were to determine the rotifer, copepod, and cladoceran fauna of Flathead Lake and to describe the diel and temporal variations of density and spatial distribution as influenced by physical, chemical, and biological features of the lake. Another objective was the recovery of records, notes, and collections of previous investigators such that irregularities in the published literature might be confirmed or corrected. Because few collections of any sort remain in the Biological Station or University of Montana museums, an attempt was made to locate museums, universities and individuals with knowledge of Flathead Lake zooplankton collections. Sediment studies have a relatively recent limnological history with studies as those of Frey (1969), Kemp (1969), Rich (1970), and St. John, Sly and Thomas (1973) revealing their value for several applications. Previous to this attempt there had been no recovery of discrete sediment samples from Flathead. These cores were analyzed for general core structure, crustacean microfossil content and a few chemical compounds. (Holje-Montana State)
W76-04235

THE BOD'S AND TOXICITY OF EFFLUENTS FROM SULPHITE PULPING FOR NEWSPRINT,
Pulp and Paper Research Inst. of Canada, Pointe Claire (Quebec).
D. J. Kubes, and A. Wong.
Water Pollution Control Directorate, Environmental Protection Service, Environment Canada, Ottawa, Canada, Technology Development Report EPS 4-WP-75-3, November 1975. 18 p, 6 fig, 9 tab, 5 ref.

Descriptors: Effluents, *Pulp wastes, Pulp and paper industry, *Biochemical oxygen demand, Toxicity, Chemicals, Fish, Mills, Reduction(Chemical), Temperature, Volume, Economics, *Sulfite liquors, Fibres, Canada, *Industrial wastes, Water quality standards.
Identifiers: Sulphite, Newsprint, Sodium-base, Wood chips, Refining, Extrapolation, *BOD5.

High yield bisulfite pulp mills, which are integrated with many eastern Canadian newsprint operations, produce acutely toxic effluents with extremely high organic loadings. Results are described of an experimental program, sponsored by Environment Canada and Carried out at the Pulp and Paper Research Institute of Canada, to measure the toxicity and five-day biochemical oxygen demand (BOD5) of laboratory-produced sodium base bisulfite pulps covering a yield range from 60 to 80%. Strength characteristics of these pulps were also determined in order to find the critical level of yield giving the pulp quality still suitable for newsprint production. Significant reductions in toxicity and BOD5 loadings are achieved by increasing pulp yield, but it is not possible to comply with Environment Canada Pulp and Paper Effluent Regulations solely by increasing yield. (Environment Canada)
W76-04245

ESTUARY STUDIES,
Environmental Protection Agency, Cincinnati, Ohio. Office of Water Programs.
For primary bibliographic entry see Field 5B.
W76-04319

IRON-INDUCED ORANGING DISEASE OF RICE IN RELATION TO PHYSICOCHEMICAL CHANGES IN A FLOODED OXISOL,
Centro Internacional de Agricultura Tropical, Bogota (Colombia).
R. H. Howeler.
Soil Sci Soc Am Proc, Vol 37, No 6, p 898-903, Illus, 1973.

Descriptors: *Rice, *Plant diseases, South America, Soils, *Iron, Absorption, Nutrients, Physicochemical properties, Toxicity, Phosphorus, Lime, Flooding.
Identifiers: *Oxisol, *Oranging disease(Rice), *Colombia.

Soil conditions associated with an oranging disease which occurs in flooded rice (Oryza sativa) grown on the Oxisols of the Llanos Orientales of Colombia were studied by measuring changes in pH, Eh (redox potential) and Fe and Mn levels in soil solutions after flooding. Rates of reduction and the build up of Fe in the soil solution vary greatly for different Llanos soils, between virgin and previously-cropped soils, and between air-dried and field-moist soils. Levels of Fe in solution could be reduced by various water management treatments and by the addition of large amounts of lime or MnO2. Oranging symptoms occur as solution Fe concentration increases and large plants were more seriously affected than small plants. Roots of affected plants were heavily coated with oxidized Fe and few active white roots formed after the increase in Fe concentration. The disease appears to be due to indirect Fe toxicity, i.e., and Fe-induced deficiency of mainly P, K, Ca, and Mg. Due to the relatively high level of Fe in solution, the roots become coated with iron-oxide reducing the root's capacity to adsorb enough plant nutrients from an already deficient environment. Under certain conditions plants may also suffer from direct Fe-toxicity, i.e., excessive Fe absorption by the plant, resulting in bronzing symptoms. A combination of direct and indirect Fe-toxicity may produce plants with a wide range of intensities of oranging symptoms and brown streaks on the leaves.--Copyright 1974, Biological Abstracts, Inc.
W76-04339

POTENTIAL HEALTH HAZARDS AND THE BURDEN OF PROOF IN ENVIRONMENTAL ACTIONS: THE IMPLICATIONS OF RESERVE MINING.
For primary bibliographic entry see Field 6E.
W76-04351

BIOLOGICAL AND WATER QUALITY EFFECTS OF ARTIFICIAL DESTRATIFICATION OF LAKE OF THE ARBUCKLES,
Oklahoma State Univ., Stillwater. School of Biological Sciences.
D. W. Toetz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 802, $5.00 in paper copy, $2.25 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, December 1975. 70 p, 16 fig, 16 tab, 23 ref. OWRT A-049-OKLA(1).

Descriptors: *Biomass, *Water quality, *Destratification, Diatoms, Algae, Cyanophyta, *Growth stages, Lakes, Chlorophyll, Mixing, *Oklahoma, *Oligotrophy, *Bass, Fishing, Eutrophication, Water pollution effects, Data collections.
Identifiers: Lake of the Arbuckles(Okla), Ham's Lake(Okla), *Artificial destratification, *Species composition, Desmids, Garton pump.

The objectives were to describe changes in algal biomass, species composition, and water quality before and after artificial destratification of Lake of the Arbuckles and Ham's Lake, Oklahoma. Growth changes in fish were also described for Ham's Lake. Water quality data were obtained at stations at Lake of the Arbuckles, algal biomass estimated, and algal species identified. A small aero-hydraulics 'gun' installed in 1973 did not destratify Lake of the Arbuckles and had no effect on water chemistry. An axial downflow pump (the Garton pump) oxygenated previously anoxic water during 1974 and increased the heat budget during 1975. Water quality was very similar, however, during the period 1973-1975 and in 1968 when no destratification was attempted. Concentration of chlorophyll a (chl.a) was about the same during 1973-1975; the dominant species were diatoms, desmids, and bluegreen algae. During 1975, destratification of Ham's Lake with the Garton pump resulted in homothermy and an isochemical distribution of O2. Both chl.a and dissolved organic carbon were lower in 1975 than in 1974 suggesting the lake is becoming more oligotrophic as a result of artificial circulation. Growth of Age I and II largemouth bass, Micopterus salmoides, was relatively constant in these years. The angling success rate was about one largemouth bass per hour, an excellent catch rate. Lake mixing was an effective management tool in Ham's Lake in improving water quality. The practice had no apparent detrimental effect on growth or catchability of largemouth bass, an important game fish.
W76-04385

BIOTIC CHANGES IN THE WILLIMANTIC/SHETUCKET RIVER ASSOCIATED WITH IMPROVEMENTS IN SEWAGE TREATMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
W. J. Widmer, F. R. Trainor, J. D. Buck, A. W. H. Damman, and W. R. Whitworth.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 817, $4.00 in paper copy, $2.25 in microfiche. Research Project Technical Completion Report, December 1975. 24 p, 1 ref, append. OWRT A-052-CONN(12). 14-31-0001-3807.

Descriptors: Sewage treatment, *Sewage effluents, *Water pollution, Activated sludge, *Municipal wastes, *Agricultural runoff, *Industrial wastes, *Chlorination, Public health, Aquatic microbiology, Fish populations, Aquatic insects, Aquatic plants, Aquatic algae, Heavy metals, *Connecticut, *Waste water treatment, Bioindicators.
Identifiers: Biotic changes, River chemistry, Ortho-phosphate, Algal assays, Microbial indicators, Willimantic/Shetucket River(Conn).

Selected populations of algae, macrophyte, bacteria, fungi, invertebrates and fish were studied for 1 1/2 years before and after an improvement in sewage treatment (primary settling to activated sludge) at Willimantic, Connecticut. Diurnal, seasonal and annual changes in biotic populations, nutrients and metabolic end-products indicate that this system receives chronic low-level industrial and agricultural pollution from the entire watershed. Minor localized effects of the treatment plant effluent were observed and were minimized by high dilution rates (about 1% annually) and rapid reoxygenation in the turbulent river. The only significant changes observed were (1) an increase in downstream ortho-phosphate, and (2) a decrease in downstream pollution indicator bacteria. Both results are attributed to changes in the sewage treatment plant, but not necessarily due to the improvement in sewage treatment per se. Chlorination procedures were still required to meet Connecticut public health standards. Rerouting of some industrial effluents coincided with a reduction in algal growth potential as measured by a new assay developed during the study. Based on presently accepted pollution indicator bacteria standards, the present status could have been attained by increasing primary plant capacity and improving chlorination efficiency, assuming that river discharge patterns would continue. (de Lara-Connecticut)
W76-04388

PLANT NUTRIENT BUDGETS AND WASTE DISPOSAL,
Connecticut Agricultural Experiment Station, Storrs.
C. R. Frink.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p 49-52, 1 tab, 5 ref.

Descriptors: *Farm wastes, *Nutrients, *Waste disposal, *Nitrogen, *Phosphorus, *Connecticut,

*Eutrophication, Fertilizers, Dairy industry, Water pollution effects.
Identifiers: Land disposal.

One of the most pressing environmental concerns in Connecticut is the enrichment of lakes and streams with plant nutrients that encourage the growth of weeds and algae. The nutrients responsible for these problems may come from fertilizers, animal and human waste disposal, or erosion from a new housing development. The largest single source of plant nutrients in Connecticut, excluding human waste, is dairy farming. Efficiency of nutrient conversion by land used in waste disposal decreases as farm size decreases. Every effort should be made in the Northeast to keep land available so that crops may utilize the applied nutrients more efficiently. Agronomic approaches reducing nitrogen losses include application of fertilizer and manure to growting crops rather than to bare or frozen soil, selection of crops with both high yield and high protein content, increased plant populations, and more extensive use of cover crops. (Merryman-East Central)
W76-04416

AGRICULTURE AND NATURE'S NUTRIENT CYCLES,
Fertilizer Inst., Washington, D. C.
W. H. Garman.
In: Relationship of Agriculture to Soil and Water Pollution, Cornell University Conference on Agricultural Waste Management, Rochester, New York, 1970, p 11-20. 2 tab, 12 ref.

Descriptors: *Agriculture, *Water pollution, *Nitrogen fixation, *Photosynthesis, *Eutrophication, Ammonia, Feed lots, Nutrients, *Cycling nutrients.
Identifiers: Nitrogen oxides.

Photosynthesis and nitrogen fixation are two important processes, animal life would soon disappear without them. The objective of this research is to determine the effect agriculture has on nature's nutrient cycles. One way that agriculture affects the nutrient cycles is its possible contribution to the pollution of streams and rivers. Because of the large number of variables involved and some unknown factors, it is much more difficult to determine the contribution of a farm than a city or factory to the pollution load of a stream. Rainfall averages 0.7 ppm nitrogen. Considerably larger amounts of nitrogen in such forms as nitrogen oxides and ammonia occur in rain, near livestock feedlots, cities, and certain types of industrial plants. Nitrogen oxides going into the atmosphere in the USA from automobile exhausts alone, and being returned to land, probably exceed two million tons of nitrogen a year. Too often these natural and artificial atmospheric inputs are almost completely overlooked and may end up being assigned to the agricultural sector. Sufficient information is lacking to determine agriculture's exact contribution to pollution. Several years of tedious work in numerous watersheds by skilled individuals is required to obtain this information. Agronomists have compared major streams in non-agricultural regions with similar ones in various agricultural regions which they have studied. This comparison will probably show that agricultural land adds no more nutrients to water than does nature herself. (Penrod-East Central)
W76-04422

INFLUENCE OF AN ANTIBIOTIC ON THE PERFORMANCE OF YEARLING HOLSTEIN STEERS,
Minnesota Univ., Minneapolis. Dept. of Animal Science.
R. D. Goodrich, D. Crawford, and J. C. Meiske.
1972 Minnesota Cattle Feeders' Report, University of Minnesota, Research Report B-177, p 67-71, 5 tab.

Descriptors: *Antibiotics, *Performance, *Cattle. Identifiers: *Holstein yearlings, Chlortetracycline(Aureomycin), Liver abscesses.

Thirty-two yearling Holstein steers were fed a ration without chlortetracycline (Aureomycin) and 31 were fed a daily ration that contained 70 mg of chlortetracycline. Cattle fed the antibiotic gained weight about 3 percent faster (3.13 vs. 3.04 lb/day), required about 5.5 percent less feed/100 lb gain (579 vs. 613 lb) and were more profitable than steers that did not receive antibiotic in their daily ration. Fifty-three percent (17 head) of the cattle that did not receive antibiotic had liver abscesses, while 29 percent (9 head) of those that received the antibiotic had liver abscesses. (East Central University)
W76-04434

5D. Waste Treatment Processes

INCINERATION DISPOSES OF REFINERY WASTES.
For primary bibliographic entry see Field 5E.
W76-04021

SUMP DESIGN FOR OIL/WATER SEPARATORS,
Empresa Nacional del Petroleo, Concon, Chile.
J. G. Miranda.
Chemical Engineering, Vol 82, No 25, p 85, November 24, 1975. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, Oil industry, *Oil wastes, *Pumps, Sumps, *Separation techniques, Oily water, Oil pollution.
Identifiers: Refinery wastes.

The commonly used gravity-type oil/water separators require an auxiliary pump to collect skimmed oil. The skimmed oil normally contains a high percentage of nonemulsified water, which is pumped out to slop tanks if the auxiliary sump is not able to separate it. A sump design is discussed which has been used for successful separation of oil/water mixtures at the Empresa Nacional del Petroleo refinery at Concon, Chile. The sump is based on the different heights reached by columns of immiscible liquids with different densities, when brought into contact with each other. The auxiliary sump is divided into four compartments, A, B, C, and D. Compartments A and C are connected by an underflow channel beneath the partition. Overflow weirs connect compartment C to D, and A to B. When the sump is operating, water collected in A and C will rise to the top of the underflow passage and act as an oil seal. Skimmed oil and water are fed into chamber A. The water will finally be collected in compartment D, while the oil will be collected in B. Pumps send the water from D back to the main separator and oil from B to the slops. A schematic drawing of the sump system is presented. (Orr-FIRL)
W76-04022

CONTROL OF POLLUTION FROM PETROLEUM REFINERIES,
J. M. Tuli, and S. B. Sheth.
Indian Chemical Journal, No 2, p 22-29, August, 1975. 2 append.

Descriptors: *Waste water treatment, *Industrial wastes, *Oil industry, *Oil wastes, Water pollution control, Treatment facilities, Air pollution, Oil pollution.
Identifiers: Refinery wastes.

The Indian Petroleum refining industry has spent considerable research time and development efforts on pollution control. The sources of various pollutants from a petroleum refinery and the treatment facilities provided for their control are discussed. Indian standards for the disposal of industrail effluents are compated with international trends. Typical pollutants from a refinery include: oily water, sour water and process condensates containing sulfides, mercaptans, ammonia, phenols and cyanides; spent caustics; storm water; cooling tower blowdown; sanitary sewage; and, effluents from the DM water treatment facility. Spent alkalies, sour water, process condensates, and DM water plant effluents are treated before combined with the remaining effluents for common treatment. The spent alkalies are neutralized with sulfuric acid; the phenol and higher mercaptans are released and skimmed while the sulfides, mercaptans and residual phenols are stripped. Steam stripping is the most commonly used process for treating sour water. Oil/water separation is accomplished by a gravity separator. Recovered oil is returned to the refinery for processing. Chemical treatment consists of chemical precipitation with alum, ferric chloride, or aluminum chloride and lime. Biological treatment includes trickling filters, activated sludge, and oxidation ponds. Sludge is dried and used as landfill. Methods for reducing the atmospheric pollution caused by refineries are also described. (Orr-FIRL)
W76-04023

BIG REFINERY HAS ADVANCED WATER-TREATMENT UNIT.
The Oil and Gas Journal, Vol 73, No 50, p 82-83, December 15, 1975. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, Oil industry, *Oil wastes, Chemical wastes, Storm runoff, Water reuse, Separation techniques, Activated sludge, Tertiary treatment, Biochemical oxygen demand, Chemical oxygen demand, Ammonia, Microorganisms, Oil pollution.
Identifiers: Refinery wastes.

The 23 mgd waste water treatment plant recently installed at Amoco Oil Company's 344,000 b/d refinery at Texas City, Texas, is the most sophisticated refinery effluent-water quality control system in the U.S. The plant will treat waste water and storm water from the refinery and from two chemical plants. The facilities include: storage for storm flow up to 82 million gal; emergency chemical spills basin; API separators for primary treatment; staged equalization, pH control, preaeration, chemical destabilization, and filtration for intermediate treatment; two-stage activated sludge for secondary treatment; and, tertiary treatment involving filtration. Oil and grease levels will be lowered 98 percent, BOD will decrease by 86 percent, COD will decrease 83 percent, ammonia levels will be 62 percent lower. The quality of the treated water will be high enough to allow it to be reused, thus reducing the industrial freshwater demand of the refinery and chemical plants. The bacteria necessary for the purification of the wastes are kept healthy and protected from shock loads by supplying nutrients and regular monitoring of the wastes entering the plant. The facility incorporates all the elements recommended by the EPA as the best practical control technology currently available plus unique, proprietary process design and operating features by Amoco. (Orr-Firl0
W76-04024

WATER POLLUTION AND ITS CONTROL AT OIL REFINERIES,
National Environmental Engineering Research Inst. Nagpur(India).
G. J. Mohan Rao.
Indian Chemical Journal, No 2, p 15-21, August, 1975. 3 tab, 11 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Oil industry, *Oil wastes, Water pollution control, Waste disposal, Biological treatment, Separation techniques, Landfills, Incineration, Oil pollution.
Identifiers: Refinery wastes, Physico-chemical treatment.

Water pollution control at Indian oil refineries is discussed. Topics covered include: water uses in a refinery; sources and characteristics of refinery wastes; environmental effects of refinery pollution; treatment and disposal of refinery wastes; and, Indian disposal standards. The most important methods of reducing pollution in refineries are the reduction of oil leakage by preventive maintenance of pumps, pipelines and equipment, prevention of the formation of oil emulsions, removal of floating oils in separators located as close as possible to the original source of waste, and the isolation and separate treatment of objectionable wastes by biological treatment. Physical-chemical treatment methods comprise: stripping and oxidation, combustion, solvent extraction and recovery of by-products, chemical flocculation, and air flotation. The following biological treatment methods are discussed: oxidation ponds, aerated lagoons, trickling filters, oxidation towers, activated sludge, and anaerobic digestion. Selection of the type of biological treatment to be used depends on costs and available space. Acid condensates, spent caustic solutions and spent acids can be disposed of in underground wells. Sludges are normally dewatered and disposed of on landfills, buried, or incinerated. (Orr-FIRL)
W76-04025

SUCCESSFUL COMBAT AGAINST TEXTILE WASTE WATER (ERFOLGREICH GEGEN TEXTILABWASSER).
Das technische Umweltmagazin, No 5, p 28-29, October, 1975. 2 fig, 5 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, *Treatment facilities, Chemical oxygen demand, Oxidation, Chemical precipitation, Flocculation, Dewatering, Color, Pulp wastes.
Identifiers: Katox treatment facility, West Germany.

The largest Katox system waste water treatment facility, built recently for the Fritz Blanke textile finishing plant at Schloetmar/Salzuflen, West Germany, is described. The facility has a daily treatment capacity of 2,400 cu m for the textile finishing waste water with COD values ranging from 600 to 1,200 mg/liter. Since biological or chemical methods are insufficient for purification and decolorization of the waste waters, the Katox system has been chosen. This system is composed of a wet catalytic oxidation stage including three aeration basins connected in series with activated carbon particles as a catalyst. This stage oxidizes most of the waste water components during intense aeration. The retention time in the catalytic oxidation stage is 3 hr. Further purification by precipitation and flocculation is performed in a second precipitation stage in which calcium hydroxide, ferrous sulfate, and flocculant aids are used. The iron hydroxides formed react with dissolved inorganic and organic substances and colloids which are thereby precipitated. Sludge with a 98 percent water content is obtained. The sludge is first dewatered to 96 percent water content by means of flocculant aids, and further dewatered to 65 percent by means of a filter press for land disposal. A residual COD value of 250 mg/liter, and essentially 100 percent decolorization are achieved. (Hamuth-FIRL)
W76-04026

APPLICATION OF OZONE TREATMENT IN THE DYEING WASTEWATER TREATMENT (SENSHOKU HAISUI SHORI NI OKERU OZON SHORI NO TEKIYO),
H. Matsuoka.
Kako Gijutsu, (Paper Converting), Vol 10, No 8, p 31-36, August, 1975. 10 fig, 1 tab, 4 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, *Ozone, *Dyes, Chemical oxygen demand, Biochemical oxygen demand, Color, Surfactants, Pulp wastes.
Identifiers: Disperse dyes, Hydrophilic dyes.

The general applications of ozone treatment for waste waters containing dyes include decolorization, decomposition of surfactants, and reduction of COD and BOD levels. The amount of ozone required for decolorization is higher for effluents containing disperse dyes than for wastes containing hydrophilic dyes. The weight ratio between the added ozone and dye ranges from 0.5 to one for wastes containing hydrophilic dyes but is greater than one for wastes containing disperse dyes. Disperse dyes which have higher contacting efficiency of dyes with ozone during treatment. If a pretreatment method, such as coagulation precipitation, is used prior to ozone treatment, most of the disperse dyes will be removed from the waste water. However, the removal of hydrophilic dyes cannot be accomplished by coagulation precipitation. The strong oxidizing ability of ozone permits the oxidization and decomposition of chromophoric groups in dyes, leading to the decolorization of waste water containing such dyes. The presence of reducing substances such as dithionites in waste water interferes with the decolorization of dyes because these substances will consume the ozone present before dyes can react with the ozone. Therefore, the separation of these substances prior to ozone treatment is desired. (Katayama-FIRL)
W76-04027

SOLVING TEXTILE WASTEWATER PROBLEMS: THREE CASE HISTORIES,
Sirrine (J. E.), Co., Greenville, S.C.
R. N. Tanner.
American Dyestuff Reporter, Vol 64, No 11, p 16-18, 44, November, 1975. 2 fig, 1 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, Treatment facilities, Design, Costs, Pulp wastes.

There are six basic steps that should be followed when designing a satisfactory treatment facility for textile wastes. The existing mill conditions should be determined by complete sampling and laboratory analyses of all waste streams. The treatment standards of existing and anticipated pollution regulations must be understood and followed. Alternative methods of treatment should be laboratory tested to determine which is the most effective. Cost studies should be performed on all technically feasible methods to establish capital, energy, chemical and manpower costs, and serve as a guide for choosing the treatment method. The facility should be designed to fulfill all the requirements. Finally, construction of the facility must be in accordance with design and specifications. A summary is presented of the development of three specific treatment facilities for wastes from a large diversified weaving mill with an integrated dyeing and finishing operation; a plant whose waste streams contained spent dye liquor, chemical and sanitary wastes; and wool scour waste from a raw grease wool processing plant. (Orr-FIRL)
W76-04028

DYESTUFF WASTES TREATMENT.
Plant Engineering and Technology, p 34, 36, 1975.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, *Dyes, Treatment facilities, Incineration, Activated carbon, Activated sludge, Ion exchange, Color, Chemical oxygen demand, Pulp wastes.

Mitsubishi Chemical Industries, Limited, has installed a complex combination of waste treatment technology at its Kurosaki dye plant. This plant produces about 600 types of dyes; the daily fluctuations in volume of waste water, COD levels, and COD components made treatment of the wastes extremely difficult. The new treatment, consisting of activated carbon adsorption, activated sludge, ion exchange, and waste incineration, achieves a 90 percent decolorization, and reduces the average COD level to 36 ppm. About 10,000 tons per day of waste water containing low COD levels (1000 ppm) are subjected to primary coagulation sedimentation, activated sludge treatment, secondary coagulation sedimentation and activated carbon adsorption. This reduces the COD levels to an average of 105 ppm. About 30 tons of activated carbon are required per day. The waste activated carbon is regenerated by combustion. The sludge is disposed of in a vertical multistage incinerator. Ninety tons of 20,000 ppm COD waste water are separated daily into 25 tons of 59,600 ppm COD and 90 tons of 2,900 ppm COD by ion exchange. The concentrated 25 tons are incinerated, while the remaining 90 tons are treated by activated carbon adsorption. The treated waste water is subjected to tertiary coagulation sedimentation and reused as cooling water. (Orr-FIRL)
W76-04029

PRESENT SITUATION OF ALKALI WASTE-WATER NEUTRALIZATION EQUIPMENT USED FOR STACK GAS DESULFURIZATION (HAIEN DATSURYUYO ARUKARI HAIEKI CHUWA SOCHI RIYO NO JISSAI NI TSUITE),
Y. Kurahashi, and K. Matsumoto.
Kako Gijutsu, (Paper Converting), Vol 10, No 9, p 566-571, September, 1975. 2 fig, 5 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, Water pollution control, Air pollution, Neutralization, Pulp wastes.
Identifiers: Alkali waste water.

The use of alkali waste water from textile industries for the desulfurization of flue gas is described. Waste water from the bleaching process and other processes which produce high alkali waste solutions can be used as the absorbing solution in a wet type flue gas desulfurization process. The pH of the waste water is also adjusted simultaneously by the desulfurization process. Waste water fed into the desulfurization process had a pH of 10-11.5, while the output water had a pH of 7-8. However, the use of waste water in desulfurization increases the COD to 1000-1500 ppm as a result of the formation of Na2CO3 and NaHSO2, and increases the suspended solids (SS) because of the dust and soot components in the flue gas. This necessitates further treatment of the output water to remove COD and SS. The output water is mixed with waste water generated from non-alkali waste producing processes. The combined wastes are treated by coagulation and filtration prior to being discharged into the public drainage system. The operating cost for flue gas desulfurization is more economical if alkali waste water is used. (Katayama-FIRL)
W76-04030

WASTE WATER PROBLEMS OF DESIZING WITH RESPECT TO LEGISLATIVE MEASURES (ABWASSERPROBLEME BEIM ENTSCHLICHTEN UNTER BERUECKSICHTIGUNG GESETZGERBERISCHER MASSNAHMEN),
P. Gerike, P. Gode, and H. Grunert.
Melliand Textilberichte International, Vol 56, No 10, p 838-841, October, 1975. 9 tab, 12 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, Legislation, Analytical techniques, Pollutant identification, Biological treatment, Pulp wastes.
Identifiers: Desizing operations.

The possibilities of eliminating the individual components from waste waters generated in desizing operations in the textile industry were studied on model waste waters at a 1:100 bath ratio. Emphasis was placed on the parameters used for the determination of the waste water charge to be imposed on effluents discharged from industrial plants without internal waste water treatment facilities in West Germany. The model waste waters containing potato starch, and those containing potato

starch in combination with polyvinyl alcohol, and carboxymethylcellulose, whose COD value, toxicity and toxicity equivalent were determined, showed that the COD value and the volume of suspended solids are chiefly responsible for the high waste water charge, while toxicity is not involved as a charge-increasing factor. Waste waters containing polyvinyl alcohol, carboxymethyl-cellulose and their combination require special treatment measures. The results indicate the possibility of substantially reducing the waste water charge by mechanical and/or biological treatment before discharge. (Hamuth-FIRL)
W76-04031

WASTE WATER PURIFICATION IN DIAZOLE PRODUCTION (OCHISTKA STOCHNYKH VOD PROIZVODSTVA DIAZOLEY),
V. F. Borodkin, T. A. Anan'eva, M. E. Al'yanov, and G. S. Zueva.
Khimiya i Khimicheskaya Tekhnologiya, Vol 18, No 8, p 1286-1289, 1975. 3 fig, 2 tab, 16 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, Oxidation, Catalysts, *Dyes, Water purificiation.
Identifiers: Diazole dye production, Catalytic oxidation.

The conditions for the catalytic oxidation of the chlorine-zinc salt of diazotized 4-nitro-2-aminoanisole as a model substance were studied in an attempt to find an optimal method for the purification of waste waters containing aromatic amines and their diazo derivatives, as generated in diazo dye production processes. Sodium salts of tetrasulfonic acid of cobalt, nickel, and manganese phthalocyanins were found to be the best catalysts for the oxidation of these pollutants with air that is admitted at a temperature of 70C. The duration of the catalytic oxidation process is 4 hr. Before oxidation, the waste water is alkalized with soda to pH 4. The sediment is removed by filitration, and the filtrate is heated to 70C for catalytic oxidation. The catalyst concentration should be around 260 mg/liter. The purification efficiency amounts to 77 percent in terms of COD reduction. (Hamuth-FIRL)
W76-04032

OZONE/UV PROCESS EFFECTIVE WASTE-WATER TREATMENT,
Houston Research, Inc., Tex.
H. W. Prengle, Jr., C. E. Mauk, R. W. Legan, and C. G. Hewes, III.
Hydrocarbon Processing, Vol 54, No 10, p 82-87, October, 1975. 10 fig, 3 tab, 15 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, *Ozone, *Ultraviolet radiation, Oxidation, Tertiary treatment.
Identifiers: Refractory compounds.

A combined ozone and ultraviolet radiation process for municipal-industrial waste water treatment was found to be effective in the chemical oxidation of toxic and highly refractory compounds such as alcohols, acids, amino acids, fatty acids, and polyhydroxyl alcohols. The process is generally used in a combination secondary and/or tertiary treatment. UV radiation enhances the reaction with ozone 100- to 10,000-fold and drives the reaction to completion, producing non-toxic compounds such as water and carbon dioxide. A table of refractory index values is presented, measuring difficulty of oxidation. Photochemical data on several refractory compounds are also provided. Process configurations are detailed for the removal of mixed cyanides, for the removal of ammonia, cyanide, and organic nitrogen compounds, and for tertiary treatment to specifically oxidize refractory organics which would produce toxic compounds if chlorinated. (Kramer-FIRL)
W76-04033

WASTE WATER TREATMENT BY GAS INTAKE APPARATUS (KITAI MAKIKOMISOCHI NI YORU HAISUI SHORI),
K. Fujie, T. Okawa, and N. Sakai.
Preprint, Society of Chemical Engineers, Tokyo, Japan, p 305-306, 1975.

Descriptors: *Waste water treatment, *Industrial wastes, *Ozone, Chemical wastes, Water treatment, Potable water, Recycling.
Identifiers: Cyanide ions, Dibutyl sebacate.

Waste water treatment by ozone was studied using a gas intake apparatus in which the waste water is recirculated in the reaction bath and ozone is dissolved into the waste water during the recirculation period. Waste water containing 100 ppm cyanide ion was treated with 3.1 liters of ozone gas. With water circulation rates of 65 liters/min and 55 liters/min, a higher cyanide efficiency was obtained by the second rate. The cyanide concentration after 20 min of treatment was 40 percent of the initial cyanide concentration with the water circulation rate at 65 liters/min, while it was 20 percent with the circulation rate at 55 liters/min. With the faster circulation rate, more than 90 percent of the cyanide could be removed within 30 min. When the water containing 17.4 ppm dibutyl sebacate was treated with ozone, nearly 80 percent of the initial dibutyl sebacate was removed after 20 min of treatment with water circulation rates of 40 liters/min and 50 liters/min. Ozone absorption into water and the decomposition of dissolved ozone were studied using drinking water. A first-order reaction was found in the decomposition of dissolved ozone, and the decomposition reaction rate increased with increased water temperature. The adsorption of ozone by water was quite high, which is desirable because then only a small amount of non-absorbed ozone will be discharged. (Katayama-FIRL)
W76-04034

PURIFYING EPSILON-CAPROLACTAM-CONTAMINATED EFFLUENT.
German Patent DS 2344-006. Issued August 21, 1975. German Patents Abstracts, Vol W, No 35, p D2, October 7, 1975.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, *Biological treatment, Microorganisms, Liquid wastes, Flocculation, *Patents.
Identifiers: Metallic salts.

A method for the purification of an epsilon-caprolactum contaminated effluent has been patented. Waste liquids containing epsilon-caprolactum are treated biologically by the aerobic culturing of epsilon-caprolactam utilizing microorganisms. Pseudomonas lactamolyticus (FERM p 1520) is grown in the liquid. The pH of the cell suspension obtained is adjusted to greater than or equal to 10 with at least one slightly water soluble, alkaline calcium compound, such as calcium hydroxide, oxide or (bi) carbonate. The agglomerate is enlarged by adding at least one iron or aluminum salt such as ferrous or ferric sulfate or chloride, alum or aluminum polychloride. The addition of the calcium salt produces rapid flocculation, while addition of the iron or aluminum salt produces a readily separable consistency. (Orr-FIRL)
W76-04035

TREATMENT OF AN INDUSTRIAL WASTE WATER BY OZONIZATION (AUFBEREITUNG EINES INDUSTRIEABWASSERS DURCH OZONUNG),
H. Adelt.
Zeitschrift fuer Wasser- and Abwasser-Forschung, Vol 8, No 5, p 142-143, 1975. 1 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, *Ozone, Biodegradation, Chemical oxygen demand.
Identifiers: Total organic carbon, Trinitrotoluene production.

Experimentation concerning the ozonization of waste waters generated in trinitrotoluene production is described. Such effluents contain nitroaromatic compounds and sulfites, and are not amenable to biological degradation. Ozonization resulted in a color shift from brownish black to light orange, a reduced COD value, and, most importantly, a biodegradable effluent with a BOD5 value of 129 mg/liter. The TOC value decreased by 6 percent due to the decarboxylation of beta-oxycarboxylic acids and nitrocarboxylic acids. (Hamuth-FIRL)
W76-04036

RECOVERY AND REUSE OF TIN-NICKEL ALLOY PYROPHOSPHATE PLATING SOLUTION BY THE COMBINATION OF REVERSE OSMOSIS AND ION EXCHANGE (GYAKUSHINTO HO, ION KOKANHO NO KUMIAWASE NI YORU SUZU-NIKKERU GOKIN PIRORINSAN MEKKI EIKI NO KAISHU OYOBI SAISHIYO),
K. Koyama, M. Ishikawa, H. Enomoto, M. Nishimura, and A. Nakagawa.
Kinzoku Hyomen Gijutsu, (Journal of Metal Finishing Society of Japan), Vol 26, No 10, p 437-440, October, 1975. 7 fig, 3 tab, 6 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Metals, Reverse osmosis, Ion exchange, *Water reuse, *Recycling, Membrane processes.
Identifiers: Metal plating, Tin-nickel alloy pyrophosphate plating.

Laboratory studies were conducted on the recovery and reuse of rinse water from tin-nickel plating operations by reverse osmosis and ion exchange processes. The tin-nickel plating bath used was pyrophosphate. The rejection rate of each of Ni(2+) and Sn(2+) was not less than 99 percent by reverse osmosis with cellulose acetate membranes. The critical concentration of chemicals by reverse osmosis in practice was estimated as one half of the original bath concentration. The quality of the water passes through the membrane was high enough to allow it to be reused in the rinsing process. A deterioration in membrane performance was not observed during contact with the rinse water for 350 hrs. A suggested closed water cycle process of tin-nickel alloy plating is proposed which will effect almost complete recovery of chemicals and direct return of the concentrated product into the plating bath. (Orr-FIRL)
W76-04037

POLLUTION MEASUREMENT IN ELECTROPLATING (A PROPOS DE LA MESURE DE LA POLLUTION EN GALVANOPLASTIC),
For primary bibliographic entry see Field 5A.
W76-04038

OZONE-BASED SYSTEM TREATS PLATING EFFLUENTS,
Houston Research, Inc., Tex.
R. L. Garrison, H. W. Prengle, Jr., and C. E. Mauk.
Metal Progress, Vol 108, No 6, p 61-62, November, 1975. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Metals, *Ozone, Ultraviolet light, Water reuse, Heavy metals, Chemical precipitation.
Identifiers: UVOX process, *Metal plating wastes, Cyanide ions.

Treatment of metal finishing wastes generally involves cyanide destruction. A process involving ozone has been developed, called UVOX, that completely destroys iron and nickel cyanides. A small amount of aritificially produced ultraviolet light is used to free cyanide so that it ca react with ozone. The UVOX process may be adapted for plating effluents of varying concentrations. Cyanide removal is followed by chemical precipitation

to remove all heavy metals, including cadmium, to below proposed EPA specifications. Advantages of the ozone treatment process over conventional alkaline chlorination were outlined. The UVOX process elimininates storage of toxicant, since the ozone is generated on site. The effluents treated with ozone have an increased dissolved oxygen content; undesirable odors, taste, and color are also removed. Residual waste such as phenols, sulfides and sulfites are destroyed by ozone but not by chlorine. Operating costs are substantially lower with ozone and reaction time is shorter than with chlorination. Resulting effluent quality is high enough to recycle at least 80 percent of the effluent, thereby saving on rinse water costs. (Kramer-FIRL)
W76-04039

ON THE SMALL SCALE WASTE WATER TREATMENT BY OZONE (SHOKIMO HAISUI NO SHORI NI TSUITE),
S. Suzuki, and K. Kishigami.
Sangyo to Kankyo, (Monthly Industry and Environment), Vol 4, No 9, p 51-59, September, 1975. 14 fig, 3 tab, 3 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Metals, *Ozone, Biochemical oxygen demand, Chemical oxygen demand.

A summary is presented on the treatment of waste waters by ozone. Ozone treatment can be used to effect sterilization, deodorization, the decomposition of phenolics, organic compounds, cyanide ions, and ABS, and the removal of iron and manganese. The advantages of ozone treatment include: ozone is a strong oxidizing agent; a wide range of solution pH will not decrease the treatment efficiency; no secondary pollution is created by using excessive amounts of ozone; and, the amount of sludge generated is small. Ozone can be applied for the treatment of sewage, public water drainage, and various industrial wastes including food processing, pulp and paper, textile, metal plating, founding, and paint wastes. A combination of coagulation and ozone is effective if the effluent BOD and COD values are not high, however, this combination is often insufficient to treat effluents containing more than 500 ppm BOD and COD. Activated sludge in combination with ozone is effective for effluents containing high BOD, COD, and color levels. Applicationof ozone before sludge treatment will decompose substances which are inhibiting to biological activities, thus increasing the effectiveness of biological treatment. Ozone is also useful for treating plating effluents containing cyanide ions. Various metals form metal complexes with CN; most of these can be decomposed by ozone. An oxidation-decomposition of phenolic compound in wastes from founding plants is effective; the treatment and construction cost of an ozone treatment facility is more economical than for activated sludge treatment. (Katayama-FIRL)
W76-04040

WASTE WATER CONTROL IN MODERN GALVANIZING PLANTS (ABWASSERKONTROLLE IN MODERNEN VERZINKUNGSANLAGEN),
W. K. V. Gale.
Metall, Vol 29, No 9, p 941-944, September, 1975. 3 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Metals, Treatment facilities.
Identifiers: *Galvanizing wastes, Pickling wastes.

The modern, large-capacity pickling wastes treatmen: unit of the British Steel Corporation's galvanizing plant at Ebbw Vale Works, England, is described. Pickling acid is regenerated at a rate of 7.2 cu m/hr to prevent water pollution. The pickling bath to be regenerated is thickened in a prestage evaporator which is combined with a venturi scrubber, after which the semi-concentrate flows into a fluidized-bed reactor containing granulated iron oxide. Here, ferrous chloride is decomposed into ferric oxide and gaseous hydrochloric acid at 800 C. The fine oxide dust present in the hot gases is separated in a venturi scrubber, and the gaseous hydrochloric acid is absorbed in the rinse water used in the pickling line under adiabatic conditions. (Hamuth-FIRL)
W76-04041

COMPLETE RECOVERY OF ITALIAN IN-PLANT WASTE WATERS,
Smogless Italiana Spa, Milan (Italy).
G. Cominetta, and T. H. Summers.
Water and Waste Treatment, Vol 17, No 6, p 12-13, June, 1974. 1 fig.

Descriptors: *Chemical industry, *Chemical wastes, *Recycling, *Water reuse, Biological treatment, Oil wastes, Filters, Activated sludge, Treatment facilities, Reverse osmosis, Activated carbon, Costs, Industrial wastes, Waste water treatment.
Identifiers: *Flocor, Italy, *Pharmaceutical wastes.

An effluent treatment plant for the liquid wastes from a new pharmaceutical chemicals factory has been built at Nimis, Nr Udine, in northeast Italy. The plant is designed to achieve a water quality sufficient for complete recycling and reuse. The facilities incorporate chemical, physical, and biological treatment processes using Flocor as the biological filter media, with subsequent activated sludge treatment. Certain concentrated waste streams that are toxic to the biological processes are burned in an incinerator. The remaining waste water contains ammonia, chloroform, solvents, oils and greases and has a BOD ranging from 650 mg/liter to 720 mg/liter. The liquid waste first flows through a tilted plate separator for the removal of oils and greases. The pH is adjusted, flocculants are added, and the wastes are then settled. The clarified liquid is applied to a forced draught stripping tower packed with Flocool for removal of ammonia and solvents. After removal by sedimentation of the solids and passage through sand filters and activated carbon units, the water discharged is suitable for reuse in the factor. The intermittent use of reverse osmosis facilities will control any buildup of mineral salinity. (Orr-FIRL)
W76-04053

CONTROL SYSTEM TREATS DYE PLANT BRINE WASTE,
Crompton and Knowles Corp., Gibraltar, Pa. Dyes and Chemicals Div.
R. H. Horning.
American Dyestuff Reporter, Vol 63, No 8, p 32, 34, 52, August, 1974.

Descriptors: *Chemical wastes, *Brines, *Reverse osmosis, *Adsorption, *Dyes, Suspended solids, Color, Activated carbon, Filters, Industrial wastes, *Waste water treatment, Separation techniques, Pennsylvania.
Identifiers: Dye wastes.

An environmental control system has been installed at a Gibraltar, Pennsylvania, dye manufacturing plant to separate and treat a complex mixture of brine waste materials. Wastes are separated into two streams, one containing concentrated salts and the other more dilute salts. A reverse osmosis technique was rejected for treating the concentrated stream because no commercially available units were known that could achieve the very high pressure needed to filter the wastes from this plant. An evaporation technique was rejected because of the odors resulting from volatile organic materials, the tendency of mixed sulfate and chloride salts to plate out, and the need to expend large quantities of energy. Salt recovery, oxidative, biological and chemical precipitation and coagulation treatment methods were eliminated for reasons ranging from discharge requirements to the nature of the salt concentration. No suitable technique was found for the treatment of the concentrated brine wastes. It was decided that it would be environmentally acceptable to dispose of the wastes at a designated ocean site more than 100 miles off-shore. The Calgon Adsorption Service carbon adsorption method was chosen to treat the dilute waste water stream. This system can process waste streams containing mixtures of organic material and sodium chloride, some sodium sulfate, and smaller amounts of other inorganic materials. Both suspended and dissolved color are removed. The suspended matter in the waste water is removed by the use of a diatomaceous earth pressure filter. The soluble color is removed by adsorption through a two stage activated carbon adsorption system. (Orr-FIRL)
W76-04054

PROCESS AND APPARATUS FOR CONTINUOUS WORKUP OF PHOSPHORUS-CONTAINING RESIDUES,
Knapsack A.G., Cologne (West Germany).
H. Ebert, U. Thummler, and H. Werner.
United States Patent 3,830,039, Issued August 20, 1974. Official Gazette of the United States Patent Office, Vol 925, No 3, p 780, August, 1974.

Descriptors: *Patents, *Phosphorus, *Chemical industry, *Chemical wastes, *Industrial wastes, Chemical precipitation, Waste water treatment, Condensation, Filtration.
Identifiers: Yellow phosphorus.

A process and related equipment have been patented for the continuous work-up of moist, phosphorus containing residues, such as those resulting from the filtration of yellow phosphorus or phosphorus containing effluent water. Moist phosphorus containing residue and hot dust originating from phosphorus furnace gas are mixed and cover the bottom portion of an electrical precipitation zone. The mixture of residue and dust is in a ratio between one and two. The resulting, substantially phosphorus-free residue is mechanically removed from the electrical precipitation zone together with the dust precipitated from the phosphorus furnace gas. A phosphorus/water mixture is produced by vaporization of the moist residue and is then passed through the electrical precipitation zone. The phosphorus/water mixture and the dust-free phosphorus furnace gas from the precipitation zone are simultaneously fed into a condensation zone located downstream of the precipitation zone. The mixture and the dust-free phosphorus furnace gas are precipitated in the condensation zone. (Orr-FIRL)
W76-04055

LIQUID WASTE TREATMENT METHOD,
R. Hatano, and M. Izumi.
Japanese Patent 49-32268, Issued August 29, 1974.

Descriptors: *Patents, *Polymers, *Chemical wastes, *Resins, *Flocculants, *Colloids, Rubber, *Waste water treatment, Industrial wastes.
Identifiers: Rubber latex manufacturing, Resin emulsion manufacturing.

A patented method is described that is particularly effective in the treatment of waste water containing colloidal polymers, produced during the manufacture of rubber latex and resin emulsions. This method is characterized by the use of polyacrylamide in addition to the flocculant of aluminum polychloride. The normally used flocculants for colloidal material require different optimum pH levels and pre-treatment. Some of these flocculants are also extremely corrosive and may necessitate the construction of treatment systems with special materials. In addition, the treated water usually requires pH adjustment to 6-8 after flocculation. In the described method, aluminum polychloride (PAC) is added to waste water and rapidly stirred. Polyacrylamide powder (PAAM), a

nonion or anion powder of 100,000 to 5,000,000 molecular weight, is then added and mixed quickly and evenly. After flocculation is achieved, precipitation or pressure flotation is used to separate the sludge from the clear water. The quantities of PAC and PAAM do not have to be exact; PAC should be within 5-1000 ppm (in Al203) and PAAM should be about 0.1-10.0 ppm. (Seigle-FIRL)
W76-04056

CHLORINE-RESISTANT FLOCCULATING AGENTS.
French Patent FR 2200-317, Issued May 24, 1974. Derwent French Patents Abstracts, Vol V, No 25, p D5, July, 1974.

Descriptors: *Patents, *Mining, Pulp and paper industry, *Flocculation, Polymers, *Waste water treatment, Industrial wastes, Alkalinity, Pulp wastes.

Chlorine resistant flocculating agents that are suitable for clarification of waste water from paper mills, petroleum refining and extraction mining have been patented. The flocculating agents are polymers with molecular weights up to or exceeding 10 to the sixth power. The polymers are prepared by mixing 40.0-99.9 weight percent of dimethylamine and 0.1-60.0 weight percent of ammonia in an aqueous solution; 65-110 weight percent (based on the dimethylamine and ammonia solution) of epichlorohydrin is added over 1-40 hours at 25-100 degrees C; aqueous alkali metal hydroxide is added to maintain the pH greater than four, until the required viscosity is achieved; the pH is adjusted to be equal to or greater than 3.0 with acid; and the product is separated. The optimal range for the weight percent of ammonia added is 3-30, and the optimal range for epichlorohydrin added to 80-100. The alkali added to maintain the more basic pH is sodium hydroxide and the acid added to maintain the more acidic pH is hydrogen chloride. (Orr-FIRL)
W76-04057

METHOD OF OXIDIZING FERROUS ION IN THE ACIDIC SOLUTION FROM THE WET REFINING AND MINE WASTE WATER (SHISSHIKI SEIREN OYOHI KOHAISUI SHORI NI OKERU SANSEI YOEKICHU NO DAIICHITETSU ION NO SANKAHOHO),
I. Saito.
Japanese Patent 49-26657, Issued July 11, 1974.

Descriptors: *Patents, *Mining, *Mine wastes, *Activated carbon, Oxidation, Iron, *Waste water treatment, Industrial wastes.
Identifiers: Ferrous ions, Wet refining wastes.

An effective method for oxidizing ferrous ions in the acidic waste water from wet refining or mine wastes is described. The previously known method of oxidation utilized copper ion as a catalyst and was hazardous even in small quantities. The use of chlorine and nitrogen oxide as a catalyst was also hazardous when the quantity reached a certain level. This patented method uses activated carbon contact which eliminates all the deleterious effects of the copper ion. Inexpensive coal may be used as the activated carbon and has been shown to exhibit a high catalytic effectiveness. The activated carbon can be used repeatedly and continuously. The method is most effective when the concentration of sulfuric acid is about 4 N. Depending on the concentration of ferrous ions in the solution, by controlling the quantity of carbon and the reaction time, ferrrous ions can be completely oxidized into ferric ions. (Seigle-FIRL)
W76-04058

STRATIFIED BED CATION EXCHANGER CUTS REFINERY WATER-TREATMENT COSTS,
Rohm and Haas Co., Philadelphia, Pa.
D. Owens.
The Oil and Gas Journal, Vol 72, No 38, September 23, 1974. 1 fig, 1 tab.

Descriptors: *Cation exchange, *Oil wastes, *Waste water treatment, Treatment facilities, *Industrial wastes, *Ion exchange, Cations, Resins, Chemicals, *Costs, Oil pollution.
Identifiers: Refinery waters.

The Torrance, California, refinery of Mobil Oil Corporation has cut the chemical cost of water treatment by using stratified-bed cation-exchangers containing both weakly acidic and strongly acidic cation-exchange resins in a single vessel. The refinery water treatment plant consists of two demineralizer systems, each including three parallel trains of cation and anion exchangers followed by mixed-bed polishing units. The physical characteristics of the weakly acidic cation-exchanger cause it to stratify itself on top of conventional strongly acidic cation-exchange resins, producing two discrete resin beds in the same vessel. In the new system the weak acid cation-exchange resin removes all cations associated with alkalinity, mainly calcium and magnesium in this plant, and produces carbon dioxide and water. The water than passes to the strongly acidic cation-exchange resin where the remaining cations of sodium and potassium are removed. The free mineral acidity caused by chlorides and sulfates is removed in the weak base anion-exchange resin; silica and carbon dioxide are removed by the strong base anion-exchanger. The effluent is further polished in a mixed-bed unit. This new system requires an amount of regenerative chemicals 20 percent less than the amount required by the older system. (Orr-FIRL)
W76-04059

BACTERIAL DEGRADATION AND EMULSIFICATION OF NO. 6 FUEL OIL,
University of Western Ontario, London. Faculty of Engineering Science.
J. E. Zajic, B. Supplisson, and B. Volesky.
Environmental Science and Technology, Vol 8, No 7, p 664-668, July, 1974. 3 fig, 6 tab, 11 ref.

Descriptors: *Oil spills, *Waste water treatment, *Microorganisms, *Bacteria, *Biodegradation, Environmental effects, Oceans, Oil pollution, Oil wastes.
Identifiers: *No. 6 fuel oil, Paraffinic hydrocarbons.

The treatment of surface water oil spillage with the use of microorganisms to degrade the oil was studied. Bacterial cultures which metabolized the paraffinic hydrocarbons present in No. 6 fuel oil and converted these paraffinic hydrocarbons into emulsifying agents were isolated from sewage. During biodegradation the small molecular weight hydrocarbons in the oil were metabolized and there was a reduction of the saturate fraction. The asphaltenes and resins fractions of the No. 6 oil were resistant to the microbial action. The extracellular emulsifier produced from the paraffinic hydrocarbons appears to be a high-molecular weight polysaccharide. Low temperatures and high salt levels act as inhibitors to the emulsification process of the bacteria but only slightly affect the activity of the extracellular emulsifier. The extracellular emulsifying agent can be produced in the laboratory and added in pure form to emulsify oil under stressful environmental conditions such as those present in an open ocean spill. (Orr-FIRL)
W76-04060

EFFLUENTS CONCENTRATION.
Soviet Patent SU 402517. Issued January 28, 1974. Soviet Inventions Illustrated, Vol. V, No. 30, p D4, September 3, 1974. 1 fig.

Descriptors: *Patents, *Oil wastes, Effluents, *Evaporation, Centrifugation, *Waste water treatment, Industrial wastes, Oil pollution.
Identifiers: Multi-stage evaporation.

A method for the concentration of effluents from petroleum treatment plants has been patented. It involves multi-stage evaporation using an inert, solid heat transfer agent, such as metal shot or granite chips. To accelerate the process and raise the degree of concentration of the effluent, the inert pre-heated transfer agent is placed in the discharge before the evaporation stage. The process starts with the heating and softening of clarified waste. The treated waste is then boiled and fed into the primary stage of a multi-stage evaporator. After passing through the various stages, the salt concentration reaches four to seven percent. Further evaporation to supersaturation occurs in another evaporator heated to 500 C by the solid heat transfer agent. The metal shot or granite chips are heated in a furnace and then gravity fed to the evaporator. The concentrated liquid is sent to a crystallizer and then to a centrifute. The last stage evaporate is removed by a thermocompressor for use as a heat transfer agent. (Orr-FIRL)
W76-04061

REFINERY PIONEERS COMBUSTION, COOLING.
Modern Power and Engineering, Vol 68, No 8, p 40-43, August, 1974.

Descriptors: *Oil wastes, *Industrial wastes, *Design criteria, *Treatment facilities, Water reuse, Waste water treatment, Desalination, Operation, Recycling.
Identifiers: Refineries, *Air cooling, *Combustion.

Gulf Oil Canada Limited's Oil refinery at Point Tupper, Nova Scotia, has successfully operated for four years with the help of technologically advanced engineering innovations. Features of the plant include substantial fuel savings, increased process efficiency, low excess air firing, air cooling, extensive pollution control for both air and water, and all-electronic instrumentation and operation. Total air cooling of the plant has eliminated the need for cooling towers and the use of toxic chemicals associated with cooling towers. The amount of fresh water required has also been reduced. The waste water treatment process includes extensive water reuse. Foul water is treated by stripping, flashing of desalter brine into a two-compartment vessel, and subsequent sand filtration. Advantages of this system include reuse of flashed steam from the desalter brine, elimination of the need for quench water to cool the brine, reuse of stripped foul water as desalter wash water, and removal of silt particles through sand filtration which would otherwise tend to stabilize the oil in water emulsion. Vortometric burners used at the plant burn many liquid fuels at high efficiency, achieve almost complete and smokeless combustion, decrease atmospheric pollution, and require minimal operator attention and mechanical maintenance. (Orr-FIRL)
W76-04063

AEROBIC TREATMENT OF TEXTILE WASTES,
Nalco Chemical Co., Chicago, Ill. Nalco Consulting Services.
M. R. Purvis.
American Dyestuff Reporter, Vol. 63, No. 8, p 19, 22, 24, 26, August, 1974. 1 tab.

Descriptors: *Industrial wastes, *Waste water treatment, *Aerobic treatment, *Biological treatment, Anaerobic conditions, Textiles, Equipment, Pulp wastes.
Identifiers: *Textile wastes.

A combination of methods for the treatment of aqueous wastes is often necessary to effectively remove pollutants, especially when treating textile wastes containing substances which may or may not be biodegradable, non-biodegradable, or toxic. Due to economic considerations, Maximum use

must be made of biological processes rather than chemical or physical methods. Optimum benefits must be obtained from the degradation performed by the microorganisms. To maintain effective biological water treatment, the peculiarities of the water being treated, the mechanics of the equipment being used, and the principles of biological treatment must be understood. A brief description of biological treatment processes is presented, including both anaerobic and aerobic procedures. The basic principles necessary to provide for healthy biological growth are: the presence of soluble carbonaceous material with a biochemical oxygen demand; the presence of oxygen for microbial respiration (in an aerobic situation); a pH between 5.5 and 8.5; the presence of sufficient nitrogen and phosphorus for synthesis of cellular material; a waste stream equalized in terms of hydraulic loading, waste composition, and temperature; the presence of micronutrient elements; adequate detention time in aeration chambers; and adequate facilities for solids/liquid separation. Problems common to aerobic treatment systems and their causes are also briefly discussed. (Orr-FIRL)
W76-04064

METHOD AND APPARATUS FOR CLEANING WASTE LIQUID CONTAINING DILUTED DYE,
Kanebo Ltd, Tokyo (Japan). (Assignee).
S. Oohara.
United States Patent 3,829,380. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol. 925, No. 2, p 605, August, 1974. 1 fig.

Descriptors: *Dyes, *Patents, *Waste water treatment, *Absorption, Liquid wastes, *Cleaning, Industrial wastes.
Identifiers: Polyamide fibers.

A method and apparatus for cleaning waste liquids which contain diluted dyes have been patented. The apparatus is an absorption column containing polyamide fibers which have a high diluted dye absorption coefficient of at least 0.5 and at least 150 meq/kg of amino group. The liquid waste stream containing dilute anionic dyes or disperse dyes is cleaned by its circulation through the absorption column. The cleaned liquid is then returned to the dyeing system for the next process. (Orr-FIRL)
W76-04065

WASTEWATER PURIFICATION IN THE SYNTHETIC FIBER PRODUCTION. EXPERIENCES GAINED WITH A BIOLOGICAL WASTEWATER TREATMENT PLANT (REINIGUNG VON ABWAESSERN AUS DER CHEMIEFASERPRODUKTION. ERFAHRUNGEN MIT EINER VOLLBIOLOGISCHEN KLAERANLAGE),
R. Wingerter, and I. Neff.
Chemische Industrie, Vol 26, No 8, p 498-500, August, 1974. 1 fig.

Descriptors: *Textiles, *Industrial wastes, *Waste water treatment, *Biological treatment, Biochemical oxygen demand, Activated sludge, Aerobic conditions, Cooling towers, Treatment facilities, *Fiber(Plant), *Pulp wastes.
Identifiers: Nylon manufacturing, Dacron manufacturing, Germany.

A modern biological waste water purification plant at a Du Pont de Nemours plant manufacturing nylon and dacron fibers at Uentrop, Germany, is described. The waste water, with a BOD load of 400-100 mg/liter and a COD level of 700-2000 mg/liter, is mixed and aerated by means of Kenics mixers. This results in a BOD reduction by 20.2 percent. The mixed waste water is then sent to the biological treatment plant with surface aerators where the efficiencies of BOD and COD removal are 95-99.5% and 92-99%, respectively. To compensate for the reduced degradation efficiency at low temperatures, the dry matter content is increased from 5-6 g/liter to 8-10 g/liter in winter. Phosphoric acid and ammonia are added to the waste water for the microorganisms. Following separation of the activated sludge in a separate basin, the excess sludge is subjected to aerobic stabilization. The purified water has further application in cooling tower systems. (Takacs-FIRL)
W76-04066

TREATMENT OF SILK SCOURING WASTE WATER BY ACTIVATED SLUDGE PROCESS (KEN SEIREN HAISUI NO KASSEI ODEI SHORI),
Osaka Univ. (Japan). Faculty of Engineering.
Y. Maeda, Y. Mizobuchi, K. Suga, and K. Ichikawa.
Hakko Kogaku Zasshi, (Journal of Fermentation Technology), Vol. 52, No. 9, p 683-688, 1974. 12 fig, 2 tab, 8 ref.

Descriptors: *Activated sludge, *Waste water treatment, Flocculation, Organic compounds, *Industrial wastes, Chemical oxygen demand.
Identifiers: *Acidification, *Silk scouring wastes, Sulfuric acid, Chemical pretreatment.

Investigations were performed on the chemical pretreatment and the activated sludge treatment of silk scouring waste water. Pretreatment consisted of acidification by the addition of sulfuric acid solution to the waste water. The floc formed from the acidified waste water was found to have an optimum pH range for flocculation of 3.0-3.5 and to contain as organic substances a nonionic surfactant used in the scouring process and sericine from the raw silk. Removal of the settled floc resulted in about a 50% reduction of the COD(cr) of the waste water. Activated sludge treatment of the pretreated waste water was conducted after neutralization with sodium hydoxide solution. The results of a batch test showed that activated sludge acclimated to the waste water for one month exhibited the best growth on waste water with 40 ppm monobasic potassium phosphate added, and had an optimum pH of 8.6, an optimum temperature of 36 C, a maximum specific growth rate of 0.12 per hour, a yield constant of 0.39 for COD(cr), a saturation constant of 296 ppm for COD(cr), and an autoxidation coefficient of 0.118 per day. A continuous test was carried out at a dilution rate of 0.125 per hour, MLSS concentration of 2600 ppm, and a COD(cr) loading range of 0.69-2.0 kg/kg/day. Eighty percent of the COD(cr) of the chemically pretreated waste water was reduced in the continuous test and the sludge volume index was consistently around 80 ml/gram. It was suggested that the silk scouring waste water contains COD(cr) components which are resistant to biodegradation, such as detergents. (Orr-FIRL)
W76-04067

OXIDISING FOUL-SMELLING SUBSTANCES IN WASTE WATER.
Netherlands Patent NL 7402-174. Issued August 21, 1974. Derwent Netherlands Patents Reports, Vol. V, No. 36, p D3, 1974.

Descriptors: *Patents, *Odor, *Food processing industry, *Industrial wastes, *Oxidation, Plastics, Weirs, Recycling, *Waste water treatment.

A patent has been issued for the purification of waste water by the oxidation of malodoraous substances. The waste water is circulated through an installation which contains a number of swill grids composed of many small capillary tubes. The capillary tubes, which may be made of a plastic material, are welded together, cut into segments, and then held in a frame. The depth of water on the grids is controlled by a weir and the air necessary for processing the waste water is blown upwards through the capillary tubes. The grids can be placed in batteries one above the other in a closed vessel or they can be offset in terraces. The water passes through successive stages of treatment and recycled if required. This method is suitable for the treatment of waste water from food processing and related industries. (Orr-FIRL)
W76-04068

TREATMENT OF LIQUID WASTE FROM SOY BEAN FOOD PROCESSING PLANTS. (RECOVERY OF SOYBEAN CURD BY MEMBRANE OSMOSIS) (DAIZU SHOKUHIN SEIZO KOJO NO HAISUI NO SHORI (SAIZU NYUSHO NO MAKUTOKAHO NI KAISHU)),
D. Nomura.
Mizu Shori Gijutsu, (Water Purification and Liquid Waste Treatment), Vol 15, No 7, p 75-79, July, 1974. 5 fig, 2 tab, 18 ref.

Descriptors: *Food processing industry, *Waste water treatment, *Filtration, Reverse osmosis, Proteins, Recycling, Activated sludge, Liquid wastes, Biochemical oxygen demand, Membrane processes, Soybean.
Identifiers: Ultrafiltration, *Soybean boiling water.

Soybean boiling water discharged from soybean processing factories contains an average of 30,000-40,000 ppm BOD, or a total BOD load of 60-80 kg per ton of beans. When ultrafiltration was used to treat these waters, the concentration recovery of protein was satisfactory but the removal of BOD was not successful. Reverse osmosis was tested as a possible solution. The relationship between the effluent concentration and the osmosis flow was observed, and it was found that an increase of concentration greatly decreased the osmotic flow. The concentration limit was determined to be about 4%, which produced 4 gfd; a 2% effluent produced 10 gfd; and 10 percent, zero. The cause of the high BOD was the sugar content in the waste water. A G-10T membrane produced by the Bioengineering Company could be used to separate 60-70% of the sugar. However, more than half of the sugar separated consisted of high molecular elements of above 10,000 and the low molecular sugar still required reverse osmosis with a special membrane. A two step method has been developed in the United States for this purpose. The first step is the elimination of the protein concentration by ultrafiltration (Abcor HFA-180); the second step is the removal of the sugar concentration by reverse osmosis with Abcor AS 197. The remaining low molecular substances causing high BOD are treatable by activated sludge methods. (Seigle-FIRL)
W76-04069

FILTRATION TECHNOLOGY ROUND-UP.
Food Manufacture, Vol 49, No 7, p 41, 44, 46, 48, July, 1974. 11 fig.

Descriptors: *Food processing industry, *Separation techniques, *Filtration, *Waste water treatment, Filters, *Waste water treatment.
Identifiers: Filter presses, Vacuum drum filters, Cartridge filters.

The food industry relies on filtration for many types of liquid/solid separation, from the removal of fine suspended matter in beverages, through separations where both filtrate and residue are important, to separations where only the solid matter is desired. A report is given on the trends and applications of filters in food manufacturing especially in the area of effluent treatment. The types of filters discussed include: vacuum drum filters used when the filter cakes produced are compressible; filter presses used when the carrier liquid is volatile or the filter cake is incompressible; and, cartridge filters used when very small quantities of solids above a certain size are to be removed. Variations in these three types of filters as produced by different manufacturers are also discussed. (Orr-FIRL)
W76-04070

EQUIPMENT FOR THE UTILIZATION OF SALT-CONTAINING WASTE-WATERS GENERATED IN METALLURGICAL PLANTS

USTANOVKA DLYA UTILIZATSII SOLENYKH STOCHNYKH VOD METALLURGICHESKOGO ZAVODA),
V. S. Yurkin, N. I. Tabachnik, and V. I. Tkach.
Vodosnabzheniye i Sanitarnaya Tekhnika, No 5, p 10-11, 1974. 2 fig.

Descriptors: *Recycling, *Metals, *Industrial wastes, *Waste water treatment, *Powerplants, Evaporation, Salts.
Identifiers: *Dissolved inorganic salts recovery, Metallurgical plants, Cold strip mill wastes.

A method for the recovery of dissolved inorganic salts from waste waters generated by metallurgical plants such as a cold strip mill is described. Two different types of waste waters, both containing oil emulsions with different sodium and calcium salt concentrations are obtained. The waste waters are evaporated by power plant steam in two separate cycles. The distilled water obtained is returned in the technological process, while the evaporation residues are fed into a cyclone furnace to destroy the organic residue and to dry the inorganic salts. (Takacs-FIRL)
W76-04071

COPPER ETCHANT EFFLUENT TREATMENT,
C. H. Roy.
United States Patent 3,816,306. Issued June 11, 1974. Official Gazette of the United States Patent Office, Vol. 923, No. 2, p 678-679, June, 1974. 1 fig.

Descriptors: *Copper, *Metals, *Industrial wastes, Effluents, Hydrogen ion concentration, *Waste water treatment, *Patents.
Identifiers: Copper etchant effluents, Hydrogen peroxide.

A patent has been issued for a process designed for the treatment of copper etchant effluents. This process can reduce the copper content of an aqueous effluent which contains the rinsings from the etchings of copper containing substrates to less than 5 ppm. The procedure includes: adjusting the pH of the effluent to < or = to 4; adding to the effluent, while vigorously agitating, hydrogen peroxide and a water soluble compound such as calcium chloride; and adding to the reaction mixture an alkaline material such as lime or a water soluble salt of carbonic acid in the amount required to adjust the pH to at least 8. (Orr-FIRL)
W76-04072

RECOVERY OF FELDSPAR AND GLASS SAND FROM GEORGIA WASTE GRANITE FINES,
Bureau of Mines, Tuscaloosa, Ala. Tuscaloosa Metallurgy Research Lab.
W. H. Eddy, E. W. Collins, and G. V. Sullivan.
Report of Investigations 7928, 1974. 11 p, 1 fig, 12 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Mining, *Flotation, Iron, Separation techniques, Georgia.
Identifiers: *Feldspar recovery, *Quartz recovery, Waste granite fines.

Laboratory batch- and small-scale continuous flotation processing tests were performed on waste granite fines from Georgia. These determined the feasibility of recovering usable feldspar and quartz products by flotation. Two flotation methods were utilized for the removal of biotite and other iron-bearing minerals: one was in an acid-cationic circuit, while the other was in an alkaline-anionic-cationic circuit. Feldspar was recovered using an acid-cationic method. Continuous flotation processing yielded a commercial-grade feldspar concentrate. About 42% of the quartz was recovered at glass sand specifications. An effective separation of potash feldspar from the bulk feldspar concentrate was achieved by batch flotation in a mineral separation cell. (Kramer-FIRL)
W76-04073

IDENTIFICATION AND DETERMINATION OF 1,4-BENZOQUINONE IN WASTE WATER OF THE COAL WORKING INDUSTRY (ZUR IDENTIFIEZIERUNG UND BESTIMMUNG VON 1,4-BENZOCHINON IN ABWAESERN DER KOHLEVERARBEI- TENDEN INDUSTRIE),
For primary bibliographic entry see Field 5A.
W76-04074

LEACHING OF POLLUTANTS FROM WOOD-CHIP SLURRY,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
T. Asano, A. L. Towlerton, and R. L. Sanks.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol. 100, No. EE4, p 855-867, August, 1974. 18 fig, 2 tab, 5 ref.

Descriptors: *Leaching, *Waste water treatment, *Industrial wastes, Pulp and paper industry, *Wood wastes, Pipelines, Water pollution sources, Water reuse, Slurries, *Pulp wastes.
Identifiers: Hydraulic pipelines, Wood chip transportation.

The pulp and paper industry has been investigating the possibility of using hydraulic pipelines to transport wood chips to processing plants. A major factor affecting the feasibility of this transport is the effect of substances leached from wood chips into the carrier water during the transit period. The economic feasibility of wood-chip pipelines is affected by the possibility of using carrier water in the pulp mill, cost of treating the polluted carrier water, and the cost of corrosion-resistant pipe material. The concept of reuse rather than treatment is stressed. Tests showed that carrier water is unfit for use in the pulping process without treatment to remove foaming characteristics and COD. However, the best solution for disposal of the wood-chip carrier water would be its utilization in the pulping process. Otherwise, it will add to the hydraulic load of the mill. Further research is planned on the accurate prediction of pollutants in prototype pipelines. (Kramer-FIRL)
W76-04075

PULP MILL GETS ITS OWN OXYGEN GENERATOR.
Chemical and Engineering News, Vol. 52, No. 29, p 15-16, July 22, 1975.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, *Wood wastes, Oxygen, Odor, *Pulp wastes, Virginia.
Identifiers: Air separation plant, *Oxygen production, Pulp bleaching.

On-site produced oxygen in wood pulp manufacture has been used at the Chesapeake Corporation of Virginia's pulp mill at West Point, Virginia. Oxygen is produced at an air separation plant with a capacity of 100 tons per day of oxygen. The oxygen is used for three processes at the mill: one step in pulp bleaching; secondary waste water treatment; and treatment for minimizing odor during black-liquor chemicals recovery. This is the first oxygen unit supplied to the paper industry. The unit uses a conventional low-pressure cycle with molecular sieve cleanup of the air ahead of cooling to remove moisture and carbon dioxide. This waste water treatment method replaced trucked-in oxygen. (Kramer-FIRL)
W76-04076

CHLORINATION OF SULPHATE PULP AT HIGH TEMPERATURE,
Swedish Forest Products Research Labs. Stockholm.
H. Norrstrom, and G. Akerlund.
Pulp and Paper Magazine of Canada, Vol. 75, No. 6, p 67-70, June, 1974. 9 fig, 2 tab, 17 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, *Chlorination, Closed conduits, Temperature, Biochemical oxygen demand, *Sulfates, Chemical wastes, *Pulp wastes.
Identifiers: Closed water systems, Hemi-cellulose.

Closing of the water system in a kraft pulp mill increases the overall system temperature and the chlorination stage temperature. This results in hemi-cellulose degrdation and reduced yield. However, the addition of 0.5% C102 (as active C12) to the chlorination stage retards these effects. Studied were made on the chlorination of a pine sulfate pulp at temperatures up to 50 C with and without the addition of C102. As a consequence of adding C102 to the process, BOD7 discharge was also reduced. Delignification, in contrast, was unaffected by the C102 addition. (Kramer-FIRL)
W76-04077

INDUSTRIAL WASTEWATER: JOINT OR SEPARATE TREATMENT. (INDUSTRIEEL AFVALWATER: SANERING OF ZUIVERING.).
F. J. Van der Schot.
Voedingsmiddelentechnologie, Vol. 7, No. 21/22, p 17, 19, 21-23, May, 1974. 1 fig, 2 tab.

Descriptors: *Food processing industry, *Industrial wastes, *Municipal wastes, *Waste water treatment, Biochemical oxygen demand, Flocculation, Biological treatment, Costs, Economics, Activated sludge, Pre-treatment(Water).
Identifiers: *Municipal-industrial wastes.

Alternatives for choosing joint or separate treatment of industrial and municipal waste waters are discussed with special regard to the food processing industry. The increasing price of water supply and the increasing tariffs on waste water discharged into the communal network will induce more industries, especially the large ones, to switch to an internal water supply or waste water purification, and possibly a combination of both. Such internal waste water treatment plants should be designed with respect to the BOD load which is usually high in waste waters generated in the food processing industry, as compared with that of municipal waste waters. Pre-treatment, preliminary settling, oxidative biological purification either in oxidizing beds or activated sludge tanks, and final settling of the flocculated pollutants are the basic stages of the industrial waste water treatment. (Takacs-FIRL)
W76-04078

EXPERIENCES WITH THE OPERATION OF STEP SWING GRATES, AND PLANS FOR THE COMBINED INCINERATION OF DOMESTIC REFUSE AND SEWAGE SLUDGE (BISHERIGE BETRIEBSERFAHRUNGEN MIT STUFFENSCHWENKROSTEN UND PLANUNGEN FUER KOMBINIERTE VERBRENNUNG VON MUELL UND KLAERSCHLAMM),
B. Pauli.
VGB Kraftwerkstechnik, No. 5, p 332-335, May, 1974. 6 fig.

Descriptors: *Industrial wastes, *Domestic wastes, *Incineration, *Waste water treatment, Waste disposal, Sewage sludge, *Sludge treatment, Equipment.
Identifiers: Municipal-industrial wastes, Step swing grates.

Experiences with the operation of step swing grate firings and their possible use for the joint incineration of domestic refuse and sewage sludge are presented. Step swing grates provide for the necessary stirring and motion of the material being incinerated and are especially suitable for the incineration of pasty, sticky materials and as material which is transformed into a sticky mass while being incinerated. Successful experiments with the incineration of sewage sludge with water contents ranging from 45 to 80% alone or together with domestic refuse were conducted in step swing

grate firings. Autonomous combustion of sewage sludge with 45-50% water content and a calorific value of 25000 kcal/kg was achieved using such firing equipment. (Takacs-FIRL)
W76-04079

JOINT TREATMENT VERSUS PRETREATMENT OF FOOD-PROCESSING WASTES,
Kraftco Corp., Glenview, Ill.
K. S. Watson, H. I. Goldsmith, and R. F. Pico.
Journal Water Pollution Control Federation, Vol. 46, No. 8, p 1927-1938, August, 1974. 7 fig, 5 tab, 6 ref.

Descriptors: *Food processing industry, *Biological treatment, *Waste water treatment, *Municipal wastes, *Industrial wastes, Operation, Treatment facilities, Pre-treatment(Water).
Identifiers: *Municipal-industrial wastes.

The use of a joint approach to treating industrial discharges compatible with municipal waste water is significant for the dairy industry, because many of the plants are small and almost all of them are connected to municipal systems. The principal reasons for joint treatment are: the least number of biological treatment plants will be required; treatment in a smaller number of plants will give a lower treatment cost for the total community; using larger, city operated plants will more likely assure the professional operation of treatment facilities; and, no pre-treatment of dairy processing wastes will be necessary. Details from the Lowville, New York, and the Champaign, Illinois, plants are given. The Lowville plant demonstrated joint treatment and showed that even in a small, relatively simple community system, in which dairy plant wastes exceed 50% of the total load, the joint approach was a mutually beneficial one. The Champaign plant was forced to provide pre-treatment facilities and demonstrated that this approach was not beneficial to the community or to the plant. Operating experiences at both plants indicated that dairy plant wastes are readily treatable in a biological treatment plant and that the edible fats, oils, and greases can be handled without problems in a municipal treatment plant. (Kramer-FIRL)
W76-04080

KRAFT EFFLUENT COLOR NATURE BEFORE AND AFTER LIME TREATMENT,
Institute of Paper Chemistry, Appleton, Wis.
H. S. Dugal, R. M. Leekley, and J. W. Swanson.
Paper Trade Journal, Vol. 158, No. 37, p 39-40, September 16, 1974.

Descriptors: Pulp and paper industry, *Waste water treatment, *Industrial wastes, Color, Lime, Ions, Metals, *Pulp wastes.
Identifiers: *Lime treatment, Kraft mill effluents, *Color removal, Polyvalent metal ions.

A study was made by the Institute of Paper Chemistry for the Environmental Protection Agency on the color of kraft effluent before and after lime treatment. The project was concerned with the chemical and physical characterization of color bodies in mill effluents, and with the lime treatment of effluents in the presence of multivalent ions. Kraft mill effluents were studied before and after two types of lime treatment, massive and stoichiometric. Massive treatment was found to be more effective on caustic extract than on decker effluent, while stoichiometric lime treatment proved to be more effective on decker than on NSSC effluents. Over 50% of the color left by conventional lime treatment processes was removed by incorporating polyvalent metal ions with lime. Metal ions and lime together were more effective color removing agents than either agent alone. (Kramer-FIRL)
W76-04081

PURIFICATION OF WASTE WATER FROM STYRENE BEAD POLYMER PRODUCTION,
Badische Anilin und Soda-Fabrik A. G., Ludwigshafen am. Rhein (West Germany). (Assignee).
H-G. Keppler, L. Zuern, and E. Stahnecker.
United States Patent 3,829,378. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol. 925, No. 2, p 604, August, 1974.

Descriptors: *Patents, *Chemical wastes, Chemical industry, *Waste water treatment, *Polymers, Flocculation, *Industrial wastes, Water purification.
Identifiers: Styrene bead production wastes, Persulfates.

A waste water purification process for water from styrene bead polymer production was patented. Vinyl pyrrolidone polymers or vinyl alcohol polymers are used as suspension stabilizers. The process consists of treating the waste water at 70 to 180 C with 0.02 to 5.00 percent by weight of the persulfate of sodium, potassium, or ammonium. The suspended matter is flocculated by this method. (Kramer-FIRL)
W76-04083

RECYCLING AND RECLAMATION--FACT OR LIP SERVICE.
Polymers, Paint and Colour Journal, Vol., 164, No. 3876, p 641, 643, July 31, 1974.

Descriptors: *Recycling, *Waste water treatment, *Chemical wastes, *Polymers, Plastics, Energy, Costs, Solvents, Research and development, *Water reuse.
Identifiers: Plastics recycling.

An investigation was conducted on the techniques adopted in the recycling and reclamation of a wide range of materials employed in the polymer-using industries in Great Britain. A number of large custom processors of solvents responded that they were using well established techniques and were not actively concerned with recycling and reclamation research. More research should be conducted in connection with more sophisticated waste; plastics are of priority consideration. A symposium organized by Corporate Development Consultants on the role of recycled plastics was held to provide a platform for presentation and discussion of the current world wide material shortages and rising energy costs. (Kramer-FIRL)
W76-04084

SCP PRODUCTION FROM SPENT SULPHITE LIQUOR (ARYUSAN PARUPU HAIEKI YORI NO SCP NO SEISAN),
Y. Tsutsui.
Journal of the Japanese Fermentation Association, Vol 32, No 7, p 278-286, July, 1974. 3 fig, 17 tab, 30 ref.

Descriptors: *Pulp wastes, Pulp and paper industry, *Recycling, *Cellulose, *Yeasts, *Sulfite liquors, Fibers(Plant), Lime, Centrifugation, *Waste water treatment, Water reuse, Fermentation.
Identifiers: SCP yeast production.

Pulp liquor can be used for the production of SCP yeast. This includes sulfite liquor from the manufacturing of rayon and synthetic fiber, and utilizes wood cellulose and hemicellulose sugar. Wood is digested and a liquor is emitted at a temperature of 85-90 C and pH of 1.8-2.5. The liquor is sent to a storage tank, and lime is added to eliminate sulfur dioxide which inhibits yeast formation. Sulfur dioxide is partially eliminated in the form of calcium bisulfite. Various nutrients can be added or it can be treated by steam stripping. When no nutrients are added, the liquor is cooled in a neutralization tank packed with limestone and continuously sent to the fermentation tank. Nutrients added as nitrogen sources include ammonia, urea, ammonia sulfate, potassium chloride, magnesium sulfate, and phosphorus pentoxide. Yeast is multiplied in the liquor by its carbon and supplementary nutrients; the liquor produces much foam by the remaining lignin sulfonic acid surfactant. The foam is then eliminated by the Waldhof fermentator and its spinner by centrifugal action. From the fermentation tank, yeast is separated and is passed to a cream tank. It is cooled, dried, crushed, sifted, and becomes a usable product. (Seigle-FIRL)
W76-04085

TREATMENT OF WASTEWATERS FROM CARBAMIDE RESIN PRODUCTION (OCHISTKA STOCHNYKH VOD OT PROIZVODSTVA KARBAMIDNOY SMOLY),
A. B. Tsfasman, G. I. Fishman, I. D. Pevzner, Ye. A. Glotova, and L. N. Yankovskaya.
Vodosnabzheniye i Sanitarnaya Tekhnika, No 5, p 12-13, 1974. 3 fig, 1 tab, 8 ref.

Descriptors: *Chemical industry, *Chemical wastes, *Waste water treatment, Alkalinity, Chemical precipitation, Resins, *Industrial wastes, Ureas.
Identifiers: *Carbamide resin production, Methylene urea, Sulfuric acid, Sodium hydroxide.

A chemical method for the removal of resin from waste waters generated in carbamide resin production is presented. Waste water containing about 20-30 g resin per liter is combined with urea at a rate of 1.2 grams per gram of resin, and with sulfuric acid up to a final concentration of 5 g/liter. The precipitation is most efficient in a pH range of 1-2. After the waste water containing urea and sulfuric acid is allowed to stand for 4 hours, it is neutralized with sodium hydroxide added in the necessary quantity to achieve a slight degree of alkalinity. The methylene urea output amounts to 110% of the initial resin content. (Takacs-FIRL)
W76-04086

PROCESS FOR TREATING ALDEHYDES,
Asabi Kasei Kogyo Kabushiki Kaisha (Japan). (Assignee).
S. Ishida, N. Oshima, K. Kurita, I. Suzuki, and I. Ohno.
United States Patent 3,829,379. Issued August 13, 1974. Official Gazette of the United States Patent Office, Vol 925, No 2, p 604, August, 1974. 1 fig.

Descriptors: *Chemical wastes, *Waste water treatment, Sulfites, Metals, Ammonium, Activated sludge, *Industrial wastes, *Patents.
Identifiers: *Aldehydes.

A process for treating aldehydes has been patented. A gas or solution containing aldehydes such as formaldehyde may be contacted with a sulfite of alkali metals with ammonium or with a mixture of 100 to 5 percent by weight of the sulfite and 0 to 95 percent by weight of the bisulfite of alkali metals or ammonium. The pH of the treatment system is kept at 6 to 11. The resulting solution may also be subjected to activated sludge treatment. (Kramer-FIRL)
W76-04087

RECYCLING OF WASTE IN THE MEAT INDUSTRY,
Hellaby Shortlant Ltd. Auckland, New Zealand.
G. A. Corban.
Food Technology in New Zealand, Vol 9, No 6, p 24-25, 27, 29, June, 1974.

Descriptors: *Food processing industry, *Water reuse, *Sewage treatment, *Waste water treatment, Biochemical oxygen demand, Costs, *Recycling, Industrial wastes, Suspended solids, Treatment facilities.
Identifiers: *Meat industry, New Zealand, Water audits, Flocor.

New methods for the treatment of sewage and the reuse of water, especially in the meat industry, have been explored. The incentive for investigation of the waste water situation in the Shortland Works, Auckland, New Zealand, was the increases in costs of sewage and water. The Shortland Works approached the problem by instituting a water audit in each department. The audit consisted of nine questions; the answers to these defined the use and possible reuse of water within the plant. The main treatment at the plant was the Flocor Tower process. In this process, the degree of BOD and solids removal was proportionate to the rate of feeding or recirculation. One pass of a load through the tower removed 33% of the BOD. It was possible to remove 80% of the BOD by making four passes through the tower or by using a 3:1 effluent:influent mixture. (Orr-FIRL)
W76-04088

ACID MINE DRAINAGE WATER MADE FIT TO DRINK.
Public Works, Vol. 105, No. 9, p 120, September, 1974.

Descriptors: *Acid mine water, *Potable water, *Waste water treatment, *Ion exchange, Sulfates, Mining, Mine acids, Drainage, Water treatment, Filtration, Resins, Pennsylvania.
Identifiers: Amberlite ion exchange resins.

The Hawk Run plant at Philipsburg, Pennsylvania, uses a modified Desal ion exchange process to convert acid mine drainage into potable water. The plant processes 800,000 gpd and expects to be processing one million gpd by the end of the year. Mine drainage problems result from the chemical interaction between metal sulfates associated with coal deposits, and with air and water. The Desal process utilizes Amberlite ion exchange resin beads which exchange carbonates for sulfates. The water is then treated by aeration, neutralization, softening, and filtration. (Orr-FIRL)
W76-04090

REMOVAL OF PHENOLS FROM WATER.
Belgian Patent BE 807-425. Issued July 5, 1974. Derwent Belgian Patents Report, Vol. 5, No. 22, p D2, July, 1974.

Descriptors: *Patents, *Phenols, *Microorganisms, Oxidation, *Anaerobic digestion, Nitrogen, Biodegradation, *Waste water treatment, Industrial wastes, Temperature, Chemical wastes.

A method for removing phenols from water has been patented. Phenols are removed anaerobically using microorganisms which decompose phenols in the presence of nitrates and/or nitrites. The microorganisms utilized may be obtained from earth or from the mud of oxidation pools around factories using or making phenol. Nitrate and/or nitrites are added to the water to maintain a nitrogen content between 0 and 10 g/liter. The phenols that can be removed by this process include phenol itself, o- m- or p-cresol, naphthols, and polyhydroxy phenols such as catechol and hydroxybenzoates and 3,4-dihydroxybenzoate. The degradation can occur between the limits of 10-50 C and a pH of 6.5-10.0. The optimal conditions are 20-35 C and pH 7.5.-8.5. (Orr-FIRL)
W76-04094

SPRAY RUNOFF DISPOSAL OF WASTE STABILIZATION POND EFFLUENT,
Ontario Ministry of the Environment, Toronto. Applied Science Section.
N. Ehlert.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No 22, Training and Technology Transfer Division (Water), Environmental Protection Service, Environment Canada, Ottawa, Canada, July 1975. 24 p, 3 fig, 6 tab, 5 ref, 2 append. 71-1-19.

Descriptors: *Sewage effluent, Ponds, Municipal wastes, Nutrient removal, Runoff, Effluents, Irrigation, *Waste water disposal, *Waste water treatment, *Canada.
Identifiers: *Spray runoff disposal, Smithville, Ontario, Irrigation - infiltration process, Effluent land disposal, Effluent quality.

Effluent from the Smithville municipal waste stabilization pond has been sprayed on a sloping (5 percent) area of soil with a permeability K less than or equal to 0.14 in/hr (1/10,000 cm/sec) for two seasons. Results indicate that a combined pond and spray runoff system can reduce the phosphorus loading on a receiving stream by 90 percent and the hydraulic input by 50 percent. Spray runoff disposal of sewage effluent appears to be a feasible means of upgrading effluent quality provided erosion and/or damage to vegetation does not occur. (Environment Canada)
W76-04161

EVALUATION OF THE BARBER - COLMAN WETOX PROCESS FOR SEWAGE SLUDGE DISPOSAL,
Ontario Research Foundation, Toronto. Dept. of Environmental Chemistry.
D. Seto, and D. K. Smith.
Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No 20, Project No 73-5-6, Environment Canada, Ottawa Canada, Environmental Protection Service, Training and Technology Transfer Division (Water), May 1975. 75 p, 15 fig, 14 tab, 23 ref, 3 append. 73-5-6.

Descriptors: Sludge, Disposal, *Waste water treatment, Costs, Equipment, Research and development, Technology, Solid wastes, Dewatering, Effluents, Organic wastes, Temperature, Pressure, Activated sludge, Alkalinity, Filtration, *Sewage sludge, Chemical oxygen demand, Slurries, *Canada, *Sludge disposal.
Identifiers: Pyrolysis, Sterilization, Recovery, Deoderizing, *Wet air oxidation, Solids reduction, Retension time, *Barber-Colman Wetox process.

An investigation was carried out to evaluate the suitability of the Barber - Colman Wetox process for municipal sewage sludge disposal. Technical and economic data for the Wetox process were gathered through literature, special correspondence, pilot plant visits as well as some experimental and analytical work performed at the Ontario Research Foundation (ORF) laboratory. These Wetox data were then analysed and compared with those of other sludge disposal methods. Particular emphasis was placed on the comparison between the Wetox process and the Zimpro process since they are rather similar in operation. Based on the evaluation of a limited amount of laboratory and pilot plant data, it appears that the Wetox process is simple to operate at 450 F, 600 psi (approximately 232 C, 4137 kPa) with 0.3 per cent sulphuric acid. The process is suitable for sewage disposal, although no commercial scale Wetox plant has yet been built. Furthermore, Wetox can achieve similar sludge destruction efficiency, i.e. approximately 80 per cent destruction of suspended solids and 65-82 per cent reduction in COD, but at a lower temperature and pressure than the corresponding Zimpro process. This is believed to be due to the design of the Wetox reactor, which ensures adequate oxygen transfer into the sludge, as well as the addition of a small amount of sulphuric acid to speed up the oxidation. (Environment Canada)
W76-04164

WASTEWATER TECHNOLOGY CENTRE, CANADA CENTRE FOR INLAND WATERS, BURLINGTON, ONTARIO, ANNUAL REPORT 1974.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W76-04173

SEMINAR ON FISH PROCESSING PLANT EFFLUENT TREATMENT AND GUIDELINES, 1974.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W76-04174

HIGH PERFORMANCE PLASTIC BACTERIAL BEDS. EXPERIMENT WITH THE TREATMENT OF INDUSTRIAL AND URBAN WASTES WATERS (LES LITS BACTERIENS PLASTIQUES A HAUTE PERFORMANCE. PRESENTATION DE L'EXPERIENCE ACQUISE DANS LE TRAITEMENT DES EFFLUENTS INDUSTRIELS ET URBAINS),
C. Camilleri, and B. Vigreux.
Techniques et Sciences Municipales, Vol 68, No 11, p 483-490, November, 1973, 7 fig.

Descriptors: *Filters, *Bacteria, *Waste water treatment, *Industrial wastes, *Biological treatment, *Municipal wastes, Equipment, Plastics, Food processing industry.
Identifiers: *Flocor, Bacterial filter beds, Municipal-industrial wastes.

High-performance plastic bacterial beds, in the form of percolation bodies, and their uses in the treatment of industrial and municipal waste waters are described. Type E plastic bacterial beds (Flocor) are designed as modules of 600 x 600 x 1,200 mm. The purificiation efficiency of one stage varies from 50 to 75%. The module has a specific surface of 90 sq m/cu m due to its being composed of plane and undulated plastic sheets. The waste water to be treated percolates from the top downward, and air circulates upward. The bacterial mass can reach up to 300 kg/cu m. The rate of percolation lies at 1.5 cu m/h per sq m. Percolation towers with plastic bacterial bed modules are currently used for the treatment of waste waters with BOD5 loads such as those generated by the starch industry and dairies, and for the treatment of urban effluents. High-performance plastic bacterial beds can be used for the enlargement of existing biological treatment plants, as a first stage before conventional biological treatment plants for industrial waste waters, and for the treatment of industrial waste waters prior to discharge into the communal sewer system. (Erdelyi-FIRL)
W76-04182

INVESTIGATION OF PHOSPHORUS REMOVAL FROM WATER,
Royal Danish School of Pharmacy, Copenhagen.
S. E. Jorgensen, O. Libor, and K. Barkacs.
Water Research, Vol 7, No 12, p 1885-1897, 1973. 4 fig, 7 tab, 8 ref.

Descriptors: *Nutrient removal, Phosphorus, Waste water treatment, *Chemical precipitation, Suspended solids, Polyelectrolytes, Water treatment, Turbidity, Flocculation, Calcium hydroxide.
Identifiers: *Phosphorus removal, Aluminum sulfate.

The removal of different phosphate compounds from water and waste water by a precipitant was investigated. In water treatment, calcium hydroxide precipitated orthophosphate with greater efficiency than aluminum sulphate; aluminum sulfate gave better efficiency in the removal of polyphosphates. Calcium hydroxide was not able to precipitate the phosphate in glucose phosphate, and aluminum sulfate effected only a slight precipitation. Bentonite and polyelectrolyte (partly anionic type), in conjunction with aluminum sulfate, gave an increased phosphate reduction, a decreased turbidity of the liquid and a decreased sludge volume. In treatment waste water, considerably better results were achieved, due to the high content of suspended matter, which helped to bind the phosphate compounds into flocs. The use of bentonite and polyelectrolyte in treating waste water gave better results,

as did calcium hydroxide used alone for precipitation. (MurphyyFIRL)
W76-04183

PREPARATION OF SURFACES FOR GALVANIZATION. TREATMENT OF THE EFFLUENTS (PREPARATION DE SURFACES AVANT GALVANISATION. TRAITEMENT DES EFFLUENTS),
L. Antoine.
Galvano-Organo, Vol 42, No 438, p 1093-1094, November, 1973.

Descriptors: *Industrial wastes, *Recycling, *Metals, *Waste water treatment, Alkalinity, Reverse osmosis, Water reuse, Lime, Iron compounds, Filtration.
Identifiers: *Galvanization.

Two different solutions for the partial recycling of waste waters from the pickling and rinsing of metallic workpieces prior to galvanization are described. These waste waters contain hydrochloric acid, and iron chloride. According to one solution, the effluents are neutralized with lime, and then oxidized for the conversion of free acid and iron chloride into calcium chloride and ferric hydroxide, the latter of which is eliminated in a static decanter. The solution obtained contains all chlorine ions in the form of calcium chloride in solution. This solution is treated continuously with sulfuric acid for the conversion of calcium chloride into hydrochloric acid and calcium sulfate, the latter being continuously removed by filtration or decanting. The residual calcium sulfate is not higher than two mg/liter. Another solution to the recycling problem, permitting different uses of the recycled water, is the separation of the total effluent into a clear fraction suitable for direct recycling, and another residual fraction by reverse osmosis. The residue is neutralized with lime, oxidized, decanted for the removal of iron hydroxide, treated with sulfuric acid for the regeneration of hydrochloric acid, and filtered for the removal of calcium sulfate. (Erdelyi-FIRL)
W76-04184

COUNTERCURRENT FLOW OSMOTIC PROCESSES FOR THE PRODUCTION OF SOLUTIONS HAVING A HIGH OSMOTIC PRESSURE,
University of the Negev, Beersheba (Israel). Research and Development Authority.
For primary bibliographic entry see Field 3A.
W76-04185

A CENTRIFUGAL METHOD FOR THE EVALUATION OF POLYMER MEMBRANES FOR REVERSE OSMOSIS,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
J. R. Hollahan, T. Wydeven, and R. P. McCullough.
Journal of Applied Chemistry and Biotechnology, Vol 23, No 9, p 669-674, 1973. 4 fig, 1 tab, 4 ref.

Descriptors: *Polymers, *Reverse osmosis, *Membranes, *Water treatment, *Laboratory tests, *Centrifugation, Screens, *Waste water treatment, Treatment facilities.
Identifiers: Space wastes.

A laboratory centrifuge method may prove to be useful for the evaluation of membrane performance during the reverse osmosis process. Results are given for cellulose acetate membranes for rejection of salt and urea dissolved solids. Implications of the study included rapid screening of membrane performance, use in laboratories with limited facilities, and possible space waste water purification. (Murphy-FIRL)
W76-04186

DISPOSAL OF LIQUID WASTE BY POWELL DUFFRYN PROCESS.
Chemistry and Industry, No 1, p 3, January, 1974.

Descriptors: *Chemical industry, *Industrial wastes, *Oil wastes, Chemical wastes, *Waste water treatment, Lagoons, Textiles, Mining, Storage tanks, Liquid wastes, Waste disposal.
Identifiers: *Chemfix process.

The 'Chemfix' process is described in which industrial liquid waste is pumped into a plant housed in a 40 ft mobile road trailer. The plant treats the waste with chemical reagents and then discharges it to form a manageable, solid material suitable for landfilling. The process was invented by Environmental Sciences Incorporated, Pittsburgh, Pennsylvania. The 'Chemfix' mobile plant can operate on sites wherever waste quantities in lagoons or storage tanks exceed 50,000 gallons. The process is applicable to wastes such as those produced by the chemical oil and petroleum, mining, textiles and metal production and treatment industries. (Murphy-FIRL)
W76-04188

SORBENT FOR REMOVAL OF HEAVY METALS,
Mobile Oil Corp., N.Y. (Assignee).
D. D. Whitehurst, S. A. Butter, and P. G. Rodenwald.
United States Patent 3,793,185, Issued February 19, 1974. Official Gazette of the United States Patent Office, Vol 919, No 3, p 963, February, 1974. 1 fig.

Descriptors: *Heavy metals, *Waste water treatment, *Patents, *Liquid wastes, Sorption, Oil wastes, Recycling.
Identifiers: *Sorbents.

A patent for using sorbents in a process of selective removal of heavy metals from liquid streams has been granted. These sorbents selectively remove alkyl lead moieties from gasoline. The sorbents are comprised of metal halides (preferably tin tetrachloride or antimony pentachloride) bonded to a suitable substrate through at least one amine or alkyl halide functional group. The sorbents can be effectively regenerated. (Murphy-FIRL)
W76-04189

SYSTEM OPTIMIZATION FOR PULP AND PAPER INDUSTRIAL WASTEWATER TREATMENT DESIGN,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
C. S. Shih, and P. Krishnan.
Water Research, Vol 7, No 12, p 1805-1820, 1975. 8 fig, 11 tab, 13 ref.

Descriptors: *Pulp and paper industry, *Industrial wastes, *Waste water treatment, *Design, Economics, Costs, Analytical techniques, Planning, Systems analysis, *Optimization.

System optimization of industrial waste treatment design is a decision inversion method which integrates dynamic programming techniques into existing process design principles. The optimum combination of various unit processes in a multistage plant are identified so as to derive the most economic decisions and meet the ultimate design criteria. A numerical example for typical paper and pulp industrial waste treatment design is presented. Many practical cost functions have also been developed for the analysis of the pulp and paper industrial waste water treatment system which consists of different process alternatives. (Murphy-FIRL)
W76-04190

BLAIR'S TRAINED BUGS EAT PVA WASTE.
Textile World, Vol 124, No 2, p 43-44, February, 1974.

Descriptors: *Activated sludge, *Waste water treatment, Biochemical oxygen demand, Chemical oxygen demand, *Textiles, Biodegradation, Microorganisms, Biological treatment, South Carolina.
Identifiers: *Polyvinyl alcohol(PVA).

Blair Mills, Belton, South Carolina, has had to use polyvinyl alcohol for warp sizing in its weaving operations. Polyvinyl alcohol is generally thought not to be susceptible to biodegradation, but Blair Mills initiated an activated sludge waste treatment system that features trained microorganisms that digest PVA and give the plant high reductions in both BOD and COD -- 95 to 98% BOD reduction in all weather conditions, and 95% COD reduction with a near neutral pH. Blair uses a Du Pont PVA product, introducing it to the sludge system slowly over time, and allowing the sludge microorganisms to acclimate to the diet change. Eventually they become 'educated' and biodegrade the product. Blair feeds the activated sludge mixtures containing decreasing amounts of usual mill effluents and increasing amounts of PVA for 30 to 40 days. The system consists of a series of screens, an equalization tank, and an agitator which blends the PVA-rich wastes. Two aeration ponds contain the effluent for five days, after which the water passes through a clarifier or separator. Solids from the bottom are recylced, and clear water at top spills over into the stream. With a 0.5 percent PVA addon at the slasher, 100 percent cottom pile warp protection equivalent to 3 percent starch addon is provided. (Murphy-FIRL)
W76-04191

INVESTIGATIONS ON THE BIOLOGICAL DIGESTION OF EVAPORATION CONDENSATES GENERATED IN SULFITE PULP PRODUCTION (UNTERSUCHUNGEN UEBER DIE MOEGLICHKEIT DER BIOCHEMISCHEN REINIGUNG DES BEI DER SULFITZELLSTOFFHERSTELLUNG ANFALLENDEN EINDAMPFKONDENSATES),
H-J. Walther, and D. Knaack.
Fortschritte der Wasserchemie, No 15, p 251-272, 1973. 1 fig, 2 tab, 26 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, *Activated sludge, Biological treatment, *Biodegradation, *Pulp wastes, Evaporation, Biological treatment.
Identifiers: Evaporation condensates.

A report is presented on investigations concerning activated sludge treatment of the evaporation condensate which is a by-product of thesulfite pulp production. The model evaporation condensate used for the experiments contained acetic acid, formic acid, furfural and sulfur dioxide. The evaporation condensate has been shown to be amenable to biochemical digestion after dilution in the presence of a nitrogen and phosphorus source, however, the morphology of the biological system was changed considerably and no longer met the conventional conception of an activated sludge process. Furfural, which should be regarded especially hazardous as to its effects on the receiving water, was completely eliminated by the biochemical treatment of the evaporation condensate. (Murphy-FIRL)
W76-04192

STEAM STRIPPING REMOVES BOD COMPOUNDS FROM CONDENSATES OF CONTINUOUS PULP MILL,
Resenlew (Oy. W.) A.B., Pori (Finland).
A. A. R. Roennholm.
Pulp and Paper International, Vol 16, No 2, p 45-49, February, 1974. 4 fig, 1 tab, 9 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, *Biochemical oxygen demand, Methanol, Costs, Recycling, Water reuse, *Pulp wastes.
Identifiers: Zero discharge, Steam stripping, Kraft pulping wastes, Turpentine.

Recovery of turpentine and methanol from the condensates of a continuous kraft pulping line is effected by a steam stripping system developed at Oy Rosenlew AB's kraft pulp mill in Finland. Increasing the turpentine yield becomes a vital cost factor, along with optimization of steam consumption using steam stripping treatment of evaporator condensates to reduce the BOD load. When fishing and evaporating the black liquor after the digester, methanol and turpentine are released, in addition to sulfur compounds. Most of the methanol is found in the condensates from the evaporator after the feed unit, and in the secondary flash vapor. Turpentine yield can be improved by decanting with lengthened flow-through time, employing a line of decanters, and adding surface-active chemicals. However, methanol content must be decreased to effect the best possible mixture of methanol, turpentine, and water for efficient decanting. Reducing kraft mill effluent while increasing the turpentine and methanol yield seems to be economically feasible by the steam stripping method, particularly in mills where the wood contains large quantities of these substances. Reuse of the condensate permits closing the system. (Murphy-FIRL)
W76-04194

CHEMICAL RECOVERY PLANT IS FINAL STAGE OF $9.2 MILLION WASTE PROGRAM,
L. Skory.
Canadian Pulp and Paper, Vol 27, No 3, p 18-19, March, 1974, 5 fig.

Descriptors: *Waste water treatment, *Industrial wastes, Pulp and paper industry, Ion exchange, *Pulp wastes, Lignins, Pollution abatement, Sulfite liquors, *Treatment facilities, Canada, Chemical wastes.
Identifiers: *Chemical recovery systems.

The Ontario Paper Company Limited, Thorold, Ontario, has found its new chemical recovery system feasible and encouraging. It is the largest such plant in the world, and is the last stage of a three-stage pollution abatement program begun by the company in 1969. The first two stages included installation of a clarifier and construction of an ion exchange plant. The chemical recovery plant combines liquid wastes from the by-product and chemical pulping operations in weak liquor storage tanks, then concentrates them in five stainless steel evaporator bodies. Liquor is drawn off to concentrated liquor tanks to be stored for burning. The system also consists of a fluid-bed reactor, and a cyclone to trap large particles. Waste treated in the chemical recovery plant is unique--an oxidized lignin with a very high inorganic content because of the plant's vanillin operation. Vanillin and ethyl alcohol are by-products of the facility's waste sulfite liquor. Problems in the treatment process were scaling in the evaporators, dust separation system plugging, and foaming in the scrubber. The company's environmental director is optimistic about working out these problems and further improving the process. Plans for recovery and subsequent sale of lignin from waste liquors are being made. (Murphy-FIRL)
W76-04195

NEW YORK FIRM BUYS CHEMICAL WASTES FOR RECYCLING.
Industrial Wastes, Vol 19, No 6, p 14-15, 27, November/December, 1973.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, *Byproducts, *Recycling, Waste disposal, Waste storage, Waste treatment.

Chem-Trol Pollution Services, Incorporated, in Model City, New York, buys or takes at no cost many wastes from chemical and electronic components manufacturers, metal plater and photo finishers and converts them to saleable organic and inorganic chemicals, solvents, metals and salts. Greater than 50% of the processed wastes are reclaimed, with a higher percentage of reclamation expected in the future. Storage capacity in the plant has been increased in order to inventory these large amounts of liquids prior to processing, with tanks and holding ponds are receptacles. Pond linings are made of a chlorinated polyethylene material. Chem-Trol is unique in that it can handle waste chemicals without generating waste itself; wastes from one process provide raw materials for another. The plant has not outfalls, and emits only carbon dioxide, water vapor, and saleable goods. Although most of its customers and suppliers are from neighboring areas, toxic wastes from as far away as Colorado are processed. The following processes are utilized by the company: filtration, thermal oxidation, pH adjustment to neutrality, distrillation, chemical fixation, physical separation, and scientific landfill. Chem-Trol is planning to set up more waste processing centers in other parts of the country and abroad. (Murphy-FIRL)
W76-04196

METHOD OF PURIFYING WASTE FLUID,
United States Steel Corp., Pittsburgh, Pa. (Assignee)
W. J. Didycz, and D. Glassman.
United States Patent 3,790,448, Issued February 5, 1974. Official Gazette of the United States Patent Office, Vol 919, No 1, p 273, February, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, *Chemical wastes, *Patents, Heat treatment, Waste water disposal, Liquid wastes.

A method of purifying waste fluid containing waste water and corrosive salts with high temperature steam to obtain a salt-free condensate is described. The waste fluid and steam were produced in a coke-producing apparatus and are normally utilized to quench coke in a coke-quenching apparatus. The waste fluid is heated in a heat exchange relationship with the steam to a predetermined temperature at a given pressure. The high temperature steam is condensed to form essentially salt-free condensate. The heated waste fluid is vaporized at the predetermined temperature and pressure to vaporize a portion of the waste fluid and to concentrate the corrosive salts to form a concentrate. The pressure is lower than the pressure of the waste steam from the coke-quenching apparatus. The heated-vaporized portion of the waste fluid is condensed to form a salt free condensate. The condensate can be used in an industrial application which eliminates the disposal of the waste fluid. (Murphy-FIRL)
W76-04197

REMOVING FINE PLASTIC PARTICLES FROM WASTE WATER.
French Patent FR 2182128, Issued December 7, 1973. French Patents Abstracts, Vol U, No 5, p D7, March 7, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, *Patents, *Chemical wastes, Flotation, Surfactants, *Plastics.
Identifiers: *Polyvinyl chloride(PVC) particles.

A process for removing fine plastic particles from waste water by flotation after foaming with surfactant and a stream of gas bubbles has been patented. Fine particles of plastic material, especially polyvinyl chloride (PVC), are removed from the waste water by adding a surface active agent, which can produce a foam, to the waste water; subjecting the waste water to the action of a stream of fine gas bubbles; and, removing the foam which has accumulated at the surface of the bath by raking. This foam contains a high concentration of plastic particles. The foam is dehydrated in a centrifuge, or by a drum filter coated with a filter aid. Almost complete elimination of the fine plastic particles from the waste water is achieved using a relatively small amount of surface active agent. (Murphy-FIRL)
W76-04198

CONTINUOUS TREATMENT OF WASTE WATER CONTAINING PHENOL BY CANDIDA TROPICALIS (CANDIDA TROPICALIS NI YORU FERNORU GANYU HAISUI NO ZEN-ROKU SHORI),
Osaka Univ. (Japan). Faculty of Engineering; and Osaka Univ. (Japan). Dept. of Fermentation Technology.
T. Shimizu, T. Uno, Y. Dan, N. Nei, and K. Ichikawa.
Hakko Kogaku Zasshi, (Journal of Fermentation Technology), Vol 15, No 11, p 809-812, November 1973. 7 fig, 2 tab, 4 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Phenols, *Biological treatment, Microorganisms, Biodegradation.
Identifiers: *Candida tropicalis.

The kinetics of continuous treatment of waste water containing phenol by Candida tropicalis No. 708 were investigated. A maximum dilution rate of 0.25/hr for treating an inlet concentration of 2,500 ppm of phenol produced an outlet concentration below one ppm. A 'wash out' of organisms occurred at a lower dilution rate when a higher inlet concentration of phenol was used. The maximum dilution rate at which 'wash out' occurred was 0.1/hr for an inlet phenol concentration of 5,000 ppm. This was caused by the inhibitory effect of the increasing concentration of phenol in the reactor, originating from an increase in the amplitude of the cyclic fluctuation of the concentration of phenol and the cell mass in the reactor with an increase of outlet phenol concentration. Both the saturation constant and the inhibition constant, for phenol-metabolism by C. tropicalis No. 708 were very low in a continuous system. The affinity of phenol as a substrate and inhibitor for C. tropicalis No. 708 was very high. Therefore, it was possible that a low outlet concentration of phenol was obtained, even if the dilution rate around the maximum value was adopted. However, the system tended to become unstable due to the inhibitory effect. (Murphy-FIRL)
W76-04199

WASTE EXTRACTION PROCESS,
Chlortrol, Inc., Russellville, Ark. (Assignee)
J. W. Gooch.
United States Patent 3,803,290, Issued April 9, 1974. Official Gazette of the United State Patent Office, Vol 920, No 2, p 744, April, 1974. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Patents, Food processing industry, Pulp and paper industry, Odor, Coagulation, Inorganic compounds, Organic compounds, *Oxidation, Separation techniques.

A waste oxidation and waste extraction process for deodorizing, coalescing, agglomerating, coagulating, and extracting organic and inorganic waste materials found in the waste streams of packing and rendering plants, paper and pulp mills, food processing plants, wood preserving plants, rice processing plants, and similar facilities was patented. The process comprises the introduction into the waste stream of an activated gas which is adsorbed on the surfaces of the suspended organic and inorganic particulate and molecular waste materials to react with the surface of the waste materials. This produces surface characteristics which eliminate molodorous properties and induce agglomeration and coagulation of the solids. (Murphy-FIRL)
W76-04200

95% BOD REMOVAL RESULT OF FRUIT PLANT MODIFICATIONS,
Chester Engineers, Inc., Corpolis, Pa.
A. F. Lisanti, and S. Balakrishnan.
Water and Waste Engineering, Vol 11, No 3, p B1-B2, B4, B6, March, 1974. 11 fig, 5 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Food processing industry, Lagoons, Aeration, Aerobic conditions, *Biochemical oxygen demand, Suspended solids, Aerated lagoons, Fruit crops, New York.

Comstock Foods, a division of Borden, Incorporated, has built a new plant at a cost of $300,000 at Red Creek, New York, on a 50-acre site. Processing and packing of apple and cherry crops constitute the bulk of the total plant production, and wastes derive from washing, peeling, pitting, slicing and clean up operations. The old waste treatment facilities consisted of four conventional anaerobic lagoons in series. They were reshaped and modified to form part of the new system in the following ways: lagoon I was reduced in size to provide about one day's detention and to serve as the raw waste equalization lagoon; lagoon II had its sides and bottom resloped to provide a liquid depth of ten feet and rip rap at the water line, and to service as the aerated lagoon; lagoons III and IV were deepened and reshaped to allow for retention of the treated effluent during dry weather. In addition to these modifications an intercept drainage trench was provided around the lagoons to prevent any runoff from adjacent fields from draining into Red Creek. The old waste water collection, pumping and screening systems were completely rebuilt to handle the flow and more effectively remove solids. Whenever a discharge from lagoon IV is made, eight-hour composite samples are taken and analyzed for BOD5 and suspended solids. Average BOD5 removals across the aerated lagoon and the entire treatment system are 83% and 96%, respectively. (Murphy-FIRL)
W76-04201

ISIS WATER TREATMENT.
The Steam and Heating Engineer, Vol 43, No 506, p 16-17, January, 1974. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, Metals, Automatic control, Automation, Water treatment, Water reuse, *Recycling, Treatment facilities.
Identifiers: *Metal finishing wastes, Zero discharge.

The Isis system of waste water treatment was introduced in 1972 by the H. D. Jackson Company, Limited, as a fully automatic method for the metal finishing and allied industries. The company has expanded its scope and the Isis systems can now be modified for handling demineralization, base exchange, softening, and waste water purification. The Isis system consists of individual modules which allow for a high degree of flexibility. The modular units are: pressure vessels; powered valve capsule; sequence controller; and, pH controller and recorder. The Isis modular system is used for boiler water treatment at the Willenhall Works of Albert Marston and Company Limited, a manufacturer of aluminum products anodised at their own plant. The anodising process uses sulfuric acid electrolytes or chromic acid to give an opaque finish, with dyes added. For most applications the coating must be sealed, and this is most effectively carried out in pure boiling water. The installation, although complete in itself for boiler water treatment, forms the nucleus of a plant which is to be extended to handle future demand for treatment of final rinse water, sealing water, and vat make-up for anodising plant, and ultimately provide recirculation and reuse of effluent. The rising cost of water and the stringent control of effluents for disposal to the sewers will enhance the value of a plant of this type which can simultaneously perform all these functions, not only in metal finishing works but also in other industries. (Murphy-FIRL)
W76-04202

WASTE WATER RECYCLING PROCESS,
D. W. Brackett.
IBM Technical Disclosure Bulletin, Vol 16, No 9, p 3056-3057, February, 1974. 1 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Water reuse, *Recycling, Metals, Neutralization, Hydrogen ion concentration, Filtration, Reverse osmosis, Electrodialysis, Evaporation, Centrifugation, Treatment facilities.
Identifiers: *Metal finishing wastes, Zero discharge, Freeze crystallization.

Waste water from metal plating and metal etching operations is treated for recovery of useful solid contents, while permitting recycling of the water through the plant without creating the sludge deposits that result from ordinary waste water treatment methods. The method does not require the addition of sludge-forming chemicals to the waste water; saves the cost of valuable material reclaimed from the waste waters; and, does not require large, expensive evaporator or freezer units. Separation of solids from the water is accomplished in a gradual, progressive fashion with reentrant feedbacks at several points, thereby minimizing the loads on the individual purifying units. The process consists of equalization tanks, pH adjustment facilities, filters, reverse osmosis or electrodialysis units, organic material removal unit, evaporator, freeze crystallizer unit, and centrifuge. (Murphy-FIRL)
W76-04203

MANGANESE REMOVAL BY TWO-STATE FILTRATION (ENTMANGANUNG DURCH ZWEISTUFFENFILTRATION),
K. Rudolf.
Fortschritte der Wasserchemie, No 15, p 125-136, 1973. 6 fig, 1 tab, 4 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Metals, *Filtration, Iron, *Manganese.
Identifiers: Demanganization.

Large amounts of iron and manganese present together in raw water will cause problems with removing the manganese through a filter bed. Due to its lower oxidation capacity, iron is converted more quickly to an insoluble form. It covers the filter sand grains and clogs the catalytic surfaces necessary for demanganization. These difficulties can be overcome by two-stage filtration; iron removal is accomplished in the first stage and manganese removal in the second. Discussion is presented on how the demanganization state was artificially prepared for operating at full capacity, on investigations concerning the hydraulic pollution load capacity, and on the state of the qualitative clear water parameters, connected with it. Operational results showed that at full capacity of the demanganization state of up to 250 cu m/hour per rapid filter a manganese-free filtrate can be obtained. (Murphy-FIRL)
W76-04204

DEEP-TANK EXTENDED AERATION OF REFINERY WASTES,
Atlantic Richfield Company, Harvey, Ill.
W. L. Rose, and R. E. Gorringe.
Journal Water Pollution Control Federation, Vol 46, No 2, p 393-403, February, 1974. 9 fig, 6 tab, 2 ref.

Descriptors: *Waste water treatment, *Industrial wastes, Oil industry, Separation techniques, Pilot plants, Activated sludge, Aerated lagoons, Biological treatment, Surface runoff, *Oil wastes, *Aeration, Indiana.
Identifiers: Refinery wastes.

The Atlantic Richfield Company's refinery in East Chicago, Indiana, manufactures a wide range of products by employing these processes: atmospheric and vacuum distillation, fluid catalytic cracking, catalytic reforming, alkylation, polymerization, propane deasphalting, distillate desulfurization, solvent dewaxing, solvent treating, chemical treating, and hydrotreating. Combined refinery waste water and surface runoff water averaging five mgd is first treated in API-type gravity oil separators that remove a large portion of free oils and coarse solids. The separator effluent is pumped to the extended aeration activated sludge plant where it undergoes biological oxidation in the specially developed deep-tank aeration system. In order to determine the feasibility of using biological treatment for the refinery effluent two separate pilot plant studies were undertaken. The studies involved the use of a continuous bench-scale biological unit and an extended aeration basin with no sludge recirculation. The complete mix activated sludge process utilizing a deep-tank configuration has been demonstrated to be a practical method for the treatment of refinery waste waters. The system has the ability to treat effluent with varying organic loadings and oxygen demands that are inherent in daily refinery operation. (Murphy-FIRL)
W76-04205

POSSIBILITIES AND LIMITATIONS IN THE COMBINED PURIFICATION OF DOMESTIC AND INDUSTRIAL WASTE WATERS (MOEGLICHKEITEN UND GRENZEN DER GEMEINSAMEN REINGUNG HAEUSLICHER UND GEWERBLICHER ABWAESSER),
K. R. Imhoff.
VDI-Berichte, No 207, p 93-101, 1973. 9 fig, 5 tab, 7 ref.

Descriptors: *Industrial wastes, *Municipal wastes, *Waste water treatment, Pre-treatment(Water), Biological treatments, Anaerobic conditions.
Identifiers: *Municipal-industrial wastes, *Combined treatment.

Possibilities and limitations of the combined treatment of domestic and industrial waste waters are discussed. Joint treatment is economical when the specific costs of treatment sharply reduce with increasing throughput capacities, especially up to 100,000 population equivalents. The combined treatment creates no particular problems provided that the industrial waste waters are non-toxic and their share does not exceed 30% of the total volume to be treated. Most industrial waste waters require mechanical-chemical pre-treatment (such as precipitation and neutralization) prior to their discharge into the municipal sewer system. The addition of industrial waste water is also essential for establishing the correct nutrient balance of the waste water for efficient biological purification. Waste waters that are too concentrated should be treated anaerobically rather than by the aeration method due to the limited capacity of the latter. Special waste waters may require two-stage biological purification with separate sludge systems and different kinds of bacteria. Examples demonstrating the combined purification and domestic and pre-treated industrial waste waters are presented. (Erdelyi-FIRL)
W76-04207

METHOD FOR TREATING WASTE LIQUOR,
M. Ohta.
United States Patent 3,806,435, Issued April 23, 1974. Official Gazette of the United States Patent Office, Vol 921, No 4, p 1600, April, 1974.

Descriptors: *Patents, *Waste water treatment, *Liquid wastes, Electrolysis, Sulfides, Iron, Zinc, Aluminum, Hydrogen sulfide, *Industrial wastes, Sulfite liquors.

A patent was issued for a method for treating waste liquor. It consists of subjecting a waste liquor containing one or more sulfidic contaminants (hydrogen sulfide, alkaline sulfides or inorganic or organic hydrosulfides) to electrolytic treatment. An anode of iron aluminum or zinc/aluminum and a cathode of iron or zinc are used. Thus, the sulfidic contaminants are eliminated from the waste liquor. (Murphy-FIRL)
W76-04209

NEW DIATOMITE FILTER SOLVES COOLING AND WASH WATER PROBLEMS FOR PLASTIC MOLDING OPERATION,
Plastic Mold Co., Rocky Hill, Conn.
M. A. Gerber.
Filtration Engineering, Vol 5, No 2, p 17, 20, March/April, 1974, 1 fig.

Descriptors: *Filters, *Diatomaceous earth, *Water reuse, *Plastics, Economics, Cooling water, *Waste water treatment, Algal control, Bacteria, *Filtration.

In the field of plastic injection molding, the quality of cooling water is vital. Pollution may occur due to particles carried in city water supplies or acquired from rusting or paint-chipping from steel storage tanks. There may also be algae growth, leading to clogging and overheating. The Prototype and Plastic Mold Company in Rocky Hill, Connecticut, encountered both these problems. A viable solution was a new diatomaceous earth filter, which produced clear water. This operated using a cooling towere with a storage sump to recirculate the water. The modular industrial filter takes only two minutes to complete the backwashing and new pre-coating cycle. Microscopic particulate matter, including algae and many bacteria were removed. This new industrial filter has been tried for one year with no breakdowns and readily apparent economic advantages. (Murphy-FIRL)
W76-04210

METHOD FOR PURIFYING THE LIQUOR OF A GALVANIZING PROCESS PLANT AFTER CONTAMINATION,
W. L. Eddleman.
United States Patent 3,801,481, Issued April 2, 1974. Official Gazette of the United States Patent Office, Vol 921, No 1, p 300, April, 1974.

Descriptors: *Patents, *Metals, Water reuse, Recycling, Anodes, Cathodes, Electrolysis, Filtration, Iron oxides, *Industrial wastes, *Waste water treatment.
Identifiers: Galvanizing, *Metal pickle liquors.

A patent has been granted for a method of purifying a galvanizing and/or metal cleaning plant pickle liquor to permit reuse. The operation includes the steps of placing a cathode and an anode in the liquor and passing a DC current through the liquid. Nacent iron and other metal molecules are recovered by means of a magnet in the near vicinity of the cathode. Iron oxides and other metallic salts are formed near the anode. These are insoluble in the liquor, and can subsequently be removed by filtration. (Murphy-FIRL)
W76-04211

CONTINUOUS ION EXCHANGE IN FLUIDIZED BEDS,
Bradford University, Yorks, United Kingdom, Schools of Chemical Engineering.
M. J. Slater.
The Canadian Journal of Chemical Engineering, Vol 52, No 1, p 43-51, February, 1974. 15 fig, 5 tab, 15 ref.

Descriptors: *Ion exchange, *Mathematical models, *Pilot plants, Mixing, Water treatment, *Industrial wastes, Metals, Model studies, *Waste water treatment.
Identifiers: Ion exchange columns, *Fluidized beds.

A pilot plant was built to test the mathematical model developed for the prediction of the performance of a continuous ion-exchange column. This type of equipment is used industraially for water treatment and metals recovery on a large scale. The model comprises a series of fluidized beds of resin, operated with periodic flows of both phases. Experimental work was carried out on uranium extraction from clarified liquors and unfiltered ore leach pulps. Hydrodynamic studies on resin and pulp in fluidized beds were made and a simplified calculation procedure was done for mass transfer performance. The work confirmed the observations of other researchers that a series of fluidized beds can give high degrees of extraction in a short column. An assumption here of perfect mixing makes the data used specific to this apparatus. Such a mathematical model allows the investigation of possible optimum operating conditions, and an understanding of the inter-relationships between the variables. (Murphy-FIRL)
W76-04212

THE TAILINGS POND AS A WASTE TREATMENT SYSTEMS,
Montreal Engineering Company Limited, Fredericton, New Brunswick, Canada, Water Resources and Environmental Division.
A. V. Bell.
The Canadian Mining and Metallurgical Bulletin, Vol 67, No 744, p 73-78, April, 1974. 3 fig, 2 tab, 6 ref.

Descriptors: *Mining, *Waste treatment, *Metals, Industrial wastes, Solids removal, *Waste water treatment, Waste disposal, Planning.
Identifiers: *Tailings pond.

A tailings pond is the most common form of waste treatment system used by the base metal mining industry. Waste streams are discharged into this impoundment. Solid wastes are settled for perpetual storage behind a dam and the ponded area formed above these is used to treat the aqueous decant. Although the system is simple and familiar to the industry, several engineering and waste management considerations must be applied to their design and operation. This paper presents some of the considerations to be included in the planning, design, and operation of tailings systems. (Murphy-FIRL)
W76-04213

SORPTION OF TRACE QUANTITIES OF METAL IONS BY BENTONITE CLAY FROM A THIOSALT MEDIUM,
Department of Energy, Mines, and Resources, Ottawa, Ontario, Canada, Mineral Sciences Division, Mines Branch.
H. F. Steger.
Canadian Mining and Metallurgical Bulletin, Vol 67, No 744, p 90-95, April, 1974. 6 fig, 2 tab, 9 ref.

Descriptors: Mining, *Metals, *Industrial wastes, *Waste water treatment, Lime, Iron, Copper, Zinc, Manganese, Hydrogen ion concentration, Sodium, Calcium, Ions, *Srption, Clays.
Identifiers: *Bentonite clay.

Trace amounts of iron, copper, zinc and lead, in the presence of at least 100-fold excesses of sodium and calcium may be sorbed by bentonite clay from a synthetic (sulphide) mine waste water. The amounts sorbed depend on the nature of concentration of the metal ion, the number and total concentration of the metal ions present, the pH of the medium, the amount of clay used, and the contact time of the clay with the medium. The bentonite clay was tested with a sample of real 'lime-treated' mine waste water. It was found to appreciably reduce the concentration of iron, copper and zinc, but to have no significant effect on manganese concentrations. (Murphy-FIRL)
W76-04214

THE CLOSE CIRCUIT OF INDUSTRIAL WASTE WATERS (DER GESCHLOSSENE KREISLAUF BEI INDUSTREABWASSERN),
W. Bischofsberger.
VDI-Berichte, No 207, p 83-92, 1973.

Descriptors: *Food processing idustry, *Waste water treatment, *Recycling, Water reuse, Pulp and paper industry, Mining, Steel, Water rates, *Industrial wastes, Wter consumption(Except consumptive use).
Identifiers: *Materials recovery, Zero discharge.

The applications of closed water circuits by waste water treatment and recycling in industrial processes are described. The increases in the water rales and waste water discharge rates, and the reductions in load capacity of the recipients all promote measures for reduced water consumptin. The increased rate of waste water recycling is also associated with the advantage of material recovery. In West Germany, the rate of waste water recycling was about 65%, while only 5% of the industrial plants, mostly the largest ones, possessed closed water circuits. Water circuits may be in the cascade or open system, with the waste water from one tage of the process being suitable for use in a subsequent stage, or in the closed system, with the process waste water being returned to the same process after adequate treatment. Examples demonstrating waste water recycling in the mining, steel, surface-treatment, pulp and paper, coke, and sugar industries are presented. The introduction of waste water circuits has resulted in a substantial reduction in the primary water consumption. (Erdelyi-FIRL)
W76-04215

PROTEIN RECOVERY FROM DAIRY WASTES BY ELECTROFLOTATION,
D. C. Lewin, and C. F. Forster.
Effluent and Water Treatment Journal, Vol 14, No 3, p 142-143, 145, 147-148, March, 1974. 2 fig, 5 tab, 15 ref.

Descriptors: *Food processing industry, *Recycling, Proteins, *Waste water treatment, Costs, Industrial wastes, Dairy industry, *Flotation.
Identifiers: Acid coagulation, *Electroflotation, *Protein recovery, Dairy effluents.

It is economically feasible to remove a proporton of the fat and protein from dairy effluents by acid coagulation and electroflotation. This reduces the organic load applied to the secondary treatment process and produces a potentially saleable by-product. Before this potential can be fully realized, drying techniques together with the acceptability of the protein must be examined. This process is a new concept in dairy effluent treatment. As the demand for proteinaceous animal feed supplies becomes more acute and effluent treatment costs continues to rise, a prcess which combines treatment and product recovery would be attractive. (Murphy-FIRL)
W76-04216

APPLIED RESEARCH FOR RO AND UF,
Lund Univ. (Sweden). Food Engineering Div.
G. Eriksson.
Process Biochemistry, Vol 9, No 2, p 18-19, February/March, 1974. 3 fig, 2 tab.

Descriptors: *Food processing industry, *Laboratory tests, *Membrane processes, *Reverse osmosis, Desalination, *Waste water treatment, Industrial wastes, Separation techniques, Reseach and develoment.
Identifiers: *Ultrafiltration.

On a laboratory scale, pressure-driven membrane processes have been used. New applications of the ability of semi-permeable membranes to separate the molecules of a solution have been tried recently in industry. Two processes which the Swedish Board for Technical Development is testing are ultrafiltration and reverse osmois. The technique is applied to desalination, purification of waste water,electrophoretic paint recovery, and concentration and fractionation of whey and milk Problems are discussed, relating to the Swedish food industry' testing of these membrane processes. These are related to instrumentation, pressure and pressure drop, temperature, liquid flow and conductivity during the process, and resistability for specific pH. So far, this test has

been used for whey, potato starch waste water, blood, raw juice from alfalfa, fish protein solutions, and sugar solutions, in order to investigate the separation process. (Murphy-FIRL)
W76-04217

A SOLUTION FOR THE SOLVENT PROBLEM: ACTIVATED CHARCOAL PLANTS (DIE LOESUNG FUER LOESUNGSMITTEL: AKTIV-KOHLEANLAGEN).
Oberflache, Vol 14, No 1, p 18-19, January, 1974. 1 fig.

Descriptors: *Activated carbon, *Adsorptin, Hydrocarbons, Organic compounds *Waste water treatment, Industial wastes, *Solvents.

The possible uses and the functioning of activated carbon adsorbers for solvent vapors generated during surface-treatment and degreasing operations are described. The vent air containing solvent vapors is blown through an activated carbon layer for the removal of the solvent until saturation is reached, after which desorption is done with steam. The resulting mixture of steam and solvent is cooled and liquified for the gravimetic separation of water and solvent which later is recovered. Water-sluble solvents are separated from water by distillaion. Such activated carbon adsorbers were found to have a separation efficiency of 99.6% for trichloroethylene. (Erdelyi-FIRL)
W76-04218

ON THE EFFECTIVITY OF WASTE WATER BENTONITE FOR THE CLARIFICATION OF PAPER MILL EFFLUENTS (UBER DIE WIRK-SAMKEIT VON ABWASERBENTONIT ZUR KLARUNG VON PAPIERFABRIKSABWAS-SERN),
W. Brecht, F. Borner, and H-L. Dalpke.
Das Papier, Vol 28, No 3, p 89-99, 1974. 3 fig 4 tab, 7 ref.

Descriptors: Pulp and paper industry, *Industrial wastes, *Bentonite, *Waste water treatment, Polyelectrolytes, Chemical precipitation, Laboratorytests, Flocculation, Sedimentation, Oxygen demand, *Pul wastes.

Clarification experiments were conducted with several different paper mill effluents in which graduated amounts of waste water bentonite as well as a polyelectrolyte were added. During this laboratory procedure the effect on precipitation was investigated by determining the amount of isoluble matter, increase of transparency, and the reduction of oxygen demand. The latter was found by measuring the BSB5 and the CSB values. The main findings were a strong increase of flocculation and sedimentation. With nearly ten out of twenty partly highly loaded effluents, a residual content of less than 20 mg/liter insolubles was obtained. Adjustment of pH, however, is required. The decrease in oxygen demand was far less significant. (Murphy-FIRL)
W76-04220

THE EFFECT ON BRIGHTNESS STABILITY OF PULP CONSTITUTION AND WATER QUALITY,
Union Camp Corp., Princeton, N.J.
R. G. Barker, and H. M. Deutsch.
TAPPI, Vol 57, No 4, p 94-97, April, 1974. 2 fig, 5 tab, 12 ref.

Descriptors: Pulp and paper industry, *Industrial wastes,, *Waste water treatment, Water quality, *Pulp wastes.
Identifiers: Carboxyl, Carbonyl, Alum, Brightness reversion.

The effects on brightness reversion of changes in pulp carboxyl and carbonyl content, water quality, and addition of alum and rosin were investigated. Loblolly pine and hardwood kraft pulps bleached CEDED and CEHD were examined. All pulps tested showed a correlation between heat stability and brightness, with the brighter pulps being more stable. For this reason, comparisons were made at equal brightness. For untreated pulps, it was shown that the CEDED sequence produced more stable pulps than the CEDED sequence. Both reversion tests (dry heat and wet heat) showed that the low-carboxyl pulps were the most stable. Borohydride treatment to reduce carbonyl content did not improve reversion properties over normal CEDED pulps when compared at equal brightness. Treatments designed to lower the contents of the carboxyl, carbonyl, or pulp chloride were not effective in reducing the brightness reversion of sheets prepared with mill white water. Thus, improving pulp quality does not appear to be a feasible method of reducing brightness reversion when the comparison is made at equal brightness. Mill alum and rosin in combination increased the absorption coefficient of handsheets. (Murohy-FIRL)
W76-04221

WATER RECYCLING IN THE PULP AND PAPER INDUSTRY,
Buckeye Cellulose Corp., Memphis Tenn.
D. C. Haynes.
TAPPI, Vol 51, No 4, p 45-52, April, 1974. 38 ref.

Descriptors: *Pulp and paper industry, *Recycling, *Water reuse, *Waste water treatment, Pilot plants, Laboratory tests, *Pulp wastes, Industrial wastes.
Identifiers: Kraft mills.

A number of processes (laboratory proposals and plant operations) were evaluated for water recycling possibilities. Systems were evaluated on the basis of incentives for process installation. This analysis was carried out on departmental and mill-wide scales. The latest water recycling values were analyzed. The evaluation indicated that reported values for recycling are probably low. Thus, a new mill installation with the emphasis on practical recycling schemes shows a reuse factor of up to 1600% for a bleached kraft pulp mill. The all-industry recycling value last reported was 290%. (Murphy-FIRL)
W76-04222

A NEW COLOR REMOVAL PROCESS: A FIELD REPORT,
Uddeholms A.B. Hagfors (Sweden).
L. G. Anderson, B. Broddevall, S. Lindberg, and J. Phillips.
TAPPI, Vol 57, No 4, p 102-105, April, 1974. 8 fig, 2 tab.

Descriptors: Pulp and paper industry, *Waste water treatment, *Industrial wastes, Color, Liquid wastes, Costs, Biodegradation, Chemical oxygen demand, Biochemical oxygen demand, *Pulp wastes.
Identifiers: *Color removal.

A method way of cleaning effluents from bleach plants is described. A full-size installation using the process has been checked in continuous operation for more than one year. Percentage elimination figures were given for color, COD, and BOD. The color reduction efficiency had a significant environmental effect as color bodies are biodegraded very little in the recipient water. The system does not impair either the pulp quality or the production line. The fact than only liquors and no sludges are handled makes the system simple and more flexible. Captured pollutants are eliminated in the existing recovery system. The process gave a net benefit in heat and, if back pressure turbines were employed, in power. Cost aspects are also reported. (Murphy-FIRL)
W76-04223

FIBER RECOVERY INCREASES WATER REUSE AND REDUCES WASTE TREATMENT COSTS,
Dorr-Oliver, Inc., Stamford, Conn.
R. J. Mattison, and T. H. Bier.
TAPPI, Vol 57, No 4, p 66-70, April, 1974. 6 fig, 5 tab, 13 ref.

Descriptors: *Water reuse, *Recycling, Pulp and paper industry, *Waste water treatment, Costs, Economics, Equipment, Industrial wastes, *Pulp wastes.
Identifiers: *Fiber recovery.

The recovery of useful fiber from waste streams in the pulp and paper industry improves the waste treatment equipment. This recovery depends on classifying to select for long, clean fiber for sale or reuse. Several mills have installed a system to recover fiber with high freeness and minimum contamination. These are suitable for bleaching and other chemical treatment. Test programs and operating experience at these mills has shown that fiber recovery reduces waste treatment costs substantially. Waste treatment equipment requirements, fresh water requirements, and plant maintenance requirements are reduced. Useful fiber is returned to process, and/or cash income is produced from the sale of the recovered fiber. Economic and operating data supported these results. Fiber recovery from the plant sewer may pay for the equipment and can eliminate shock solids loading on gravity-separating equipment. At process stations, recovery prevented clogging of nozzles and permitted water otherwise sewered to be reused as fresh water. (Murphy-FIRL)
W76-04224

CLOSED LOOP WATER-SYSTEMS AT RED RIVER VALLEY FACTORY,
Red River Valley Cooperative, Hillsboro, N. Dak.
T. E. Paxson.
Sugar y Azucar, Vol 69, No 2, p 39-42, February, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, *Food processing industry, Water reuse, *Recycling, Closed conduits, North Dakota.
Identifiers: Zero discharge.

The new factory of the Red River Valley Cooperative in Hillsboro, North Dakota, will have a slicing capacity of 5,000 tons of sugar beets per day, a yearly production of 75,000 tons of sugar, and a cost of $30 million. Braunschweigische Maschinenbauanstalt (BMA) of Germany is responsible for its design and construction. All the water at the facility will be recycled. The five water systems employed at the factory are: beet transport and beet wash water; condenser water, a combination of cooling water and condensate from evaporators and vacuum pans; condensed water, a high-quality product resulting from condensation of live steam used in the evaporating and sugar boiling stations, as well as in the heat exchanger; sanitary waters, used to wash down floors and equipment, as well as eliminate human waste; and, a fire-control system. (Murphy-FIRL)
W76-04225

CLOSED-LOOP FILTRATION SYSTEMS HELP MIDWEST SUGAR BEET PLANT MAINTAIN HIGH WATER QUALITY,
River River Valley Cooperative, Hillsboro, N. Dak.
T. E. Paxson.
Filtration Engineering, Vol 5, No 1, p 14, 16-17, January/February, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, Food processing industry, Water reuse, *Recycling, Closed conduits, North Dakota, *Filtration.
Identifiers: Zero discharge.

The Red River Valley Cooperative is constructing a factory in North Dakota which will have a slicing capacity of 5,000 tons of sugar beets per day, a yearly production of 75,000 tons of sugar, and a cost of $30 million. Braunschweigische Maschinenbauanstalt (BMA) of Germany is responsible for its design and construction. All the water at the facility will be recycled. The five water systems employed at the factory are: beet transport and beet wash water; condenser water, a combination of cooling water and condensate from evaporators and vacuum pans; condensed water, a high-quality product resulting from condensation of live steam used in the evaporating and sugar boiling stations, as well as in the heat exchanger; sanitary waters, used to wash down floors and equipment, as well as eliminate human waste; and, a fire-control system. (Murphy-FIRL)
W76-04226

A STUDY OF RENOVATION OF PULP WASTE WATER--TREATMENT OF UNBLEACHED KRAFT PULP WASHING WASTE WATER WITH LIME, (IN JAPANESE),
Government Industrial Research Inst., Takamatsu (Japan).
S. Kato, T. Kubo, and Y. Kimura.
Nippon Kagaku Kaishi, No 10, p 1980-1986, October, 1973. 9 fig, 5 tab.

Descriptors: *Pulp and paper industry, *Industrial wastes, *Wastes water treatment, *Lime, Pilot plants, Chemical precipitation, Suspended solids.
Identifiers: *Lignin removal.

The removal of lignin in unbleached pulp washing waste water by lime treatment was studied by a continuous flow process. About 80% of lignin was removed by the lime treatment, and was independent of initial lignin content and of lime dosage above one gallon per liter. This result suggets that a part of lignin component is not removed by the lime treatment. In the precipitation of dissolved calcium as carbonate, large particles identified as calcite were obtained at about pH 11. Seed crystals were effective in their precipitation. On the basis of these results, a slurry recirculation carbonator-clarifier was devised for a pilot plant. As a result of the continuous treatment test, the suspended solid in the effluent ranged from 20 to 70 ppm at which linear velocity in the clarifier was 80 cm/hr. (Murphy-FIRL)
W76-04227

STUDIES ON AEROBIC CULTIVATION OF YEAST TO REDUCE POLLUTION POTENTIAL OF DISTILLERY WASTES,
Maharaja Sayajirao Univ. of Baroda (India). Faculty of Technology and Engineering.
K. D. Sharma, N. M. Bhatt, D. Kantawla, and M. R. S. Iyengar.
Indian Journal Environmental Health, Vol 15, No 2, p 118-126, April, 1974. 5 fig 3 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Food processing industry, *Yeast, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Biological treatment, Microorganisms, *Aerobic conditions, *Aeration.
Identifiers: *Distillery wastes.

Over 100 waste samples collected from a distillery over an extended period of time were analyzed. The waste had a pH between 3.6 to 4.7, total sugar content of 1.3 to 3.9%, BOD of 25,000 to 69,000 mg/liter and COD of 70,000 to 150,000 mg/liter. A pure culture of Saccharomyces cerevisine was adapted to the distillery waste water and optimization studies were made to determine optimum pH, time of aeration and inoculum size to obtain maximum growth of yeast and maximum reduction in total sugar and BOD. The aeration was carried out by the shake flask method. It was possible to adapt the yeast to 100% distillery waste without any nutrient addition. The growth of the adapted yeast was 0.224 mgm/mg of total sugar as compared to 0.116 mgm/mg of total sugar for the wild yeast. The optimum pH range was 5.0 to 5.5 and the optimum inoculum dosage was 85 mgms of dry yeast per 70 mls of the waste. Under optimum conditions of pH and inoculum, optimum aeration periods ranged from 90 to 120 hours. Total sugar and BOD reductions at 60% and 57.5%, respectively, were obtained under optimum conditions. (Murphy-FIRL)
W76-04228

MASSIVE SSL POLLUTION PROJECT COMPLETED,
J. Kalish.
Pulp and Paper International, Vol 16, No 1, p 49-50, January, 1974. 2 fig.

Descriptors: *Waste water treatment, *Industrial wastes, *Pulp and paper industry, Water pollution control, Foreign research, Suspended solids, Pollution abatement, Environmental engineering.
Identifiers: Sweden.

The Swedish pulp and paper industry has completed a massive, three-year SSVL Environmental Care Project costing 27 million Sw. cr. The project is unique in that it was initiated and financed largely by the industry, and involved the small companies as well as the large ones. Competitive barriers were broken as personnel from various companies moved freely through the pilot plants and testing facilities of other companies. The study has provided a statistical picture of the industry with respect to the environment, allowed for formulation of basic guidelines for the application of existing technology, and inspired continued interest in environmental problems within the industrial community. The study was begun with definition of several problem areas to be studied: systems closure, evaporation and condensate treatment, accidental discharges, bleaching, sludge treatment, biological and chemical treatment of effluents, and air pollution abatement. (Murphy-FIRL)
W76-04229

SERPENTINE AS ADSORBENT FOR REMOVAL OF PHOSPHATES FROM WATER,
Nevada University, Reno, Dept. of Chemical and Metallurgical Engineering.
R. W. Smith.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-249 666, $4.50 in paper copy, $2.25 in microfiche. Nevada Center for Water Resources Research, Reno, Completion Report, November 1975. 52 p, 23 p, 10 tab, 9 ref. OWRT A-060-NEV(1). 14-31-0001-5028.

Descriptors: *Phospates, *Adsorption, Mineralogy, *Waste water treatment, Separation techniques, Sorption, Ions, *Electrophoresis, *Oxides.
Identifiers: *Serpentine, Olivine, Chrysotile, Linde A.

Among the processes that have been suggested for phosphate removal from wastewater are sorption processes using either activated alumina or fly ash as adsorbents. Other substances, however, might be superior to alumina or fly ash either because of inherent superiority, cost or local availability. In this study serpentine was used as an adsorbent and precipitant for aqueous phosphate ions. For comparison, a number of adsorption experiments have been erformed using Linde A and olivine. Additional information on adsorption processes were obtained from electrokinetic measurements on the minerals, particularly serpentine, under varying pH phosphate concentrations. The adsorption capacity of PO4 onto various minerals decreases in the sequence chrysotile > olivine > serpentine (NY) > serpentine (CAL) > Linde A (A1203). The pH ranges of greatest PO4 adsorption are chrysotile-pH 4-10, Serpentine (CAL)-pH2, Olivine-pH2, Linde A-pH2, and Serpentine (NY)-pH2. (Fallin-Nevada)
W76-04233

ANNUAL REPORT 1973.
Canada Centre for Inland Waters, Burlington (Ontario); and Environmental Protection Service, Burlington (Ontario). Waste Water Technology Centre.
1974. 13 p, 17 fig, 5 tab.

Descriptors: *Waste water treatment, *Biological treatment, *Mine drainage, Industrail wastes, Water quality control, Polychlorinated Biphenyls, Recycling, Oil spills, Equipment, Research and development.
Identifiers: Sludge dewatering, Phosphorus removal, Soil processes, Recovery.

Purpose, facilities, and current projects of each section of the Environmental Protection Service are described. For each major project or study, significant findings and results are given. These include development and demonstration of a variety of waste water treatment and reclamation processes. The Environmental Emerigency Branch focuses on oil spill equipment and countermeasures. (Environment Canada)
W76-04238

FISH PROCESSING OPERATIONS LIQUID EFFLUENT GUIDELINES.
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5G.
W76-04240

USE OF LIME IN THE TREATMENT OF MUNICIPAL WASTEWATERS,
Domtar Ltd. Research Centre, Senneville (Ontario).
R. J. P. Brouzes.
Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No. 21, Environment Canada, Ottawa, Canada, Environmental Protection Service, Training and Technology Transfer Division (Water) (1974), 127 p, 3 append, 8 fig, 19 tab, 143 ref.

Descriptors: Water quality, Water pollution control, *Waste water treatment, *Lime, Fertilizers, Color, Turbidity, Iron, Magnesium, Hydrogen ion concentration, Phosphus, *Municipal wastes, *Phosphates.
Identifiers: *Phosphorus removal, Clarification, Carbonation.

The primary objective was to develop a process for treating municipal wastewaters based on the addition of lime. The principal parameters studied were the removal of phosphorus, suspended solids, COD, BOD, and microorganisms in order to produce an effluent suitable for discharge, with or without subsequent treatment. The addition of magnesium and/or iron salts was also studied to determine if phosphorus removal could be improved. In general, the addition of lime to pH 10.0 removed most of the phosphorus, but produced low quality effluent with regard to other characteristics. Addition of lime to pH 11.0 and 11.5 produced effluents of considerably improved quality. At pH 11.5, phosphates were reduced by 98 per cent; turbidity also was reduced by 98 percent; BOD and COD reduction averaged 74 per cent and 67 per cent respectively; suspended solids were reduced by 80 per cent and total coliforms were totally and consistently eliminated (from approximately 2 million/100 ml to zero in nine jar test trials). It was therefore probable that this effluent, if produced under optimal conditions, was of sufficient quality to be discharged to most Canadian bodies of water. Where further purification is desired, air stripping for ammonia removal and treatment with activated carbon, or ozone could be employed for further BOD reduction. Existing primary treatment facilities can be readily converted to a lime treatment system with some modifications. (Environment Canada)

W76-04242

HEAVY METALS IN AGRICULTURAL LANDS RECEIVING CHEMICAL SEWAGE SLUDGES, VOLUME II,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
J. C. Van Loon.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 25, Training and Technology Transfer Division (Water), Environmental Protection Services, Environment Canada, Ottawa, Canada, October 1975. 41 p, 2 fig, 15 tab, 12 ref, append.

Descriptors: *Heavy metals, *Sewage treatment, Sludge, Soil analysis, Vegetation, Erosion, Mercury, Acids, Sampling, *Canada, *Sewage sludge, *Waste treatment, Water pollution effects.
Identifiers: *Land disposal, Toronto, Acetic acid extractable metals, Strong acid extractable metals, Ontario.

In the previous year of this contract (1) studies were initiated in the following areas: (1) Sludge heavy metal characterization of North Toronto, Newmarket and Point Edward sewage treatment plants, (2) Heavy metal contamination of farm soils and vegetation resulting from sludge applications (Newmarket area). (3) Surface water, heavy metal contamination resulting from sludge disposal. (4) Assessment of analytical data. (See also W74-08397) During the present year, work was continued in all these subject areas. Heavy metal contamination studies of soils, vegetation, groundwater and surface water were carried out at the Burlington Skyway plant disposal farm and the North Toronto plant disposal area. A study of garden vegetable contamination due to the use of sludge for home gardening was also initiated. Again as in the previous year emphasis was placed on using standard reference materials to give validity to the analytical data. (Environment Canada)
W76-04244

NUTRIENT CONTROL IN SEWAGE LAGOONS, VOLUME II.
Pollutech Pollution Advisory Services, Ltd., Oakville (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 23, Training and Technology Transfer Division (Water), Environmental Protection Services, Environment Canada, October 1975. 57 p, 14 fig, 1 tab, append.

Descriptors: *Sewage lagoons, *Phosphorus, *Chemicals, Waste treatment, Sewage, Effluents, *Waste water treatment, Sludge, Biochemical oxygen demand, Laboratory tests, Temperature, *Nutrients, *Nutrient requirements, Canada.
Identifiers: *Alum, Chemical conditions, Ontario.

An investigation was conducted of the effects of chemical addition on the operation of sewage lagoons, and the physical and or chemical conditions in the lagoon on the removal of phosphorus. Laboratory lagoon simulators were used to evaluate the effects of temperature, chemical dosage and influent phosphorus concentration on the performance of a typical lagoon. Raw sewage from the Village of Shelburne, Ontario was used as feed for the simulators. The addition of 200 mg/l of alum effectively reduced phosphorus concentrations in the lagoon effluent to below 1 mg/l. Higher temperatures resulted in increased phosphorus in the effluent from untreated sewage. However the addition of alum at 200 mg/l minimized this effect. The achievement of steady state operation in a lagoon with an 80 day retention time was found to require several months operation. Alum dosage was the most important factor in the phosphorus removal process in the lagoon. All other factors investigated had a relatively minor effect on the phosphorus concentration in the chemically treated effluent. (See also W74-10043) (Environment Canada)

W76-04246

LAND DISPOSAL OF SEWAGE SLUDGE, VOLUME II, (APRIL, 1973-MARCH, 1974).
Guelph Univ. (Ontario). Dept. of Land Resource Science; and Guelph Univ. (Ontario). Dept. of Microbiology.
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 24, Training and Technology Division (Water), Environmental Protection Services, Environment Canada, Ottawa, Canada, October 1975. 276 p, 9 fig, 200 tab, 16 ref, append.

Descriptors: *Sewage sludge, Runoff, Seasonal, Bromegrass, Corn(Field), Loam, Chemical analysis, Nitrogen, Metals, Copper, Zinc, Crop response, Crop production, Nutrient requirements, Soil treatment, *Canada, Waste disposal, Pollutant identification.
Identifiers: *Land disposal, Ontario.

The report covers runoff studies with Fall, Winter and Spring applied sewage sludge, field rate and source of sludge studies with bromegrass on a loam soil and with corn on a loam, a sandy loam and a clay loam soil. A greenhouse trial with different rates and sources of sludge on two soils at three pH levels is also reported. Fluid digested sewage sludges were used which came from calcium oxide treatment of Newmarket sewage, aluminum sulphate treatment of Point Edward sewage and ferric chloride treatment of North Toronto sewage. Chemical analyses of the sludges, soil nitrogen, crop yields and nutrient and metal content of crops are presented along with microbial studies of the sludges and the crops grown. Detailed descriptions of the soils used are also presente. In runoff studies high rates of sludge greatly increased nutrient loss from sloping land but metal losses were small with the sludges and rates used in this study. In general, there was some crop growth response to the sewage sludges but in two trials a smaller response to the aluminum sludge from Point Edward was observed than to the others. Nitrification studies and plant nutrient analyses lead one to believe that the aluminum sludge has provided less available nitrogen to the crops than the other sludges but this does not fully explain the poorer growth with aluminum sludge. This effect of Al sludge does not appear to be related to difference in uptake of nutrients or metals other than nitrogen. Differences in uniformity of chemical composition of sludges from the three plants is discussed. (Environment Canada)
W76-04247

STUDY OF THE WASTE CHARACTERISTICS OF FISH PROCESSING PLANTS, LOCATED IN THE MARITIME REGION,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W76-04252

REVIEW OF CANADIAN DESIGN PRACTICE AND COMPARISON OF URBAN HYDROLOGIC MODELS.
Maclaren (James F.) Ltd., Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W76-04254

PROCESS FOR CONDITIONING SEWAGE SLUDGES,
Rheinstahl A.G., Dortmund (West Germany). (Assignee)
N. Rosler, W. G. Rudat, and E. Albrecht.
US Patent No 3,922,221, 6 p, 1 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1939, November 25, 1975.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Sludge treatment, Dehydration, Sludge disposal, Flocculation, Incineration, Proteins, Separation techniques, Hydrogen ion concentration.

The sludge is atomized into small droplets and directed into the upper end of a readction tower through which is passed a hot gas atmosphere. The sludge is collected in a bath at the bottom of the tower and is conveyed to a station at which a flocculant is added and it is then passed to the device for carrying out its dehydration. It has been found with the invention that the proteins in the sludge droplets are denatured irreversibly by the hot gas atmosphere practically immediately, and the proteins lose their water-binding capacity by coagulating. At the same time, the proteins bind to themselves other dehydration-inhibiting substances so that with the subsequent flocculant addition, a very high efficiency is obtained. Since for sludge elimination, a sludge burning system often follows the dehydration, a particularly simple and expedient form of the invention provides that the sludge droplets are passed through a CO2-containing flue gas atmosphere coming from the combustion system. The flue gas atmosphere brings about another feature, i.e. that the sludge droplets are acidified, on being heated to pH values below 4. The combined action of sudden heating and sufficiently acid basicity of the sludge droplets leads to an additional precipitation of other substances difficult to filter off. Lime is added as a neutralizing agent, by which the fatty acids contained in the sludge are transformed into insoluble lime soaps, which are easy to separate on dehydrating. (Sinha-OEIS)
W76-04269

APPARATUS FOR TREATING WASTE WATERS,
Etudes et Procedes d'Assainissement Purator, Rennes (France). (Assignee)
R. Lewandowski.
US Patent No 3,922,224, 8 p, 7 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1940, November 25, 1975.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, Water pollution control, Water quality control, *Heavy metals, Chemical reactions, Reduction(Chemical), Separation techniques, Ion exchange, Copper, Cadmium, Lead.
Identifiers: Electro-plating industry.

The invention provides an apparatus for eliminating the undesirable ions in waste water by chemical displacement so as to recover metals not in the form of salts but in the form of metallic cations precipitating in the form of pulverized metal. The effluent containing copper, cadmium, palladium, lead and tine is passed through a bed containing a mixture of sand and metallic particles resting on a performed bed plate mounted above a continuously pressurized gas compartment. The metallic particles are from the class of metals including iron, aluminium and zinc having a higher electromotive voltage than the waste metals. The waste metals attach themselves to the particles of higher electromotive voltages as the electric current turns the bed into a cathode and causes an electro-chemical action which prevents the surfaces of the particles from oxidizing. The gas bubbles up through the bed with a force which continuously agitates the sand and particles sufficiently to produce an abrasive action between sand and metal particles. (Sinha-OEIS)
W76-04270

METHOD AND APPARATUS FOR MEASURING SEWER SEDIMENTATION INFILTRATION AND FLOW,
For primary bibliographic entry see Field 5A.
W76-04275

METHOD AND APPARATUS FOR COMPACTING FLUID SLUDGES,
Societe Alsthom, Grenoble (Franche). (Assignee)
E. Condolios, and M. Merle.
US Patent No 3,923,652, 5 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 314, December 2, 1975.

Descriptors: *Patents, *Sludge, *Sludge treatment, *Industrial wastes, *Waste water treatment, *Flocculation, Water pollution treatment, Compaction, Pressure, Equipment.
Identifiers: Secondary flocculation.

Secondary flocculation is obtained by adding flocculating agents to the liquid in which the primary flocculation has been started up. The first fine agglomerated substances or small flakes which are not very solid and not very dense are gathered together into large flakes. After having effected the primary and secondary flocculation, a non-homogenous sludge is formed by large hydrophobous flakes each retaining its unity, with, between each flake, clear interstitial liquid or water. A slight controlled stirring of the sludges ensures their settling and allows the removal of water and the removal of damp solid substances to be scavenged. The controlled stirring of the sludge is effected mechanically, slowly, at all points, by inclined blades placed in the tank containing the sludge and formed with holes which are well determined for obtaining the settling of the flakes of sludge. The sludges thus settled are extracted through the bottom of the tank, by a perforated conical screw rotating slowly in a conical recess whose point, constituting the sludge outlet orifice, is directed downwards, so that the discharge of sludge decreases as the extraction orifice of the device is approached, so as to send the interstitial liquid which is between the flakes back towards the top and to make the latter come out in a compact mass towards the orifice. (Sinha-OEIS)
W76-04278

LEVEL DETECTION SYSTEM,
Vesmat Investments, Inc., Fort Meyers, Fla. (Assignee)
R. E. McKinney.
US Patent No 3,923,655, 5 p, 7 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 315, December 2, 1975.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Water pollution control, *Activated sludge, Temperature, Measurement, Sewage effluents, Instrumentation, Settling basins.
Identifiers: Sedimentation tanks.

The invention provides a method and apparatus for detecting and controlling the level of sludge in a sedimentation tank of a sewage treatment system. In addition to the heat generated by the biochemical reaction in the aeration tank, the mechanical equipment used for aeration, mixing and/or agitation in the activated sludge of a sewage treatment system also generates heat. Normally the sewage together with activated sludge is discharged from the aeration tank to a secondary sedimentation tanks where the sludge and supernatant is retained under quiescent conditions for a period of an hour or more. In the sedimentation tank lack of motion and the low metabolism of microorganisms in the activated sludge permit the liquid to lose some of its heat energy to atmosphere and to the ground around the tank. Thus, a temperature differential is established between the incoming activated sludge and the fluid near the surface of the sedimentation tank. Endogenous respiration by the microorganisms or microbials in the activated sludge will also release heat and create a temperature differential between the concentrated activated sludge layer adjacent the bottom of the tank and the settled supernatant less viscous liquid above the activated sludge in the tank. By the use of multiple probes space vertically within the tank for determining temperatures at various levels in the tank or by the use of a probe on a vertically movable line or gear strip, it is possible to determine the vertical temperature differentials within the tank and to thereby locate the activated sludge layer. (Sinha-OEIS)
W76-04279

PACKAGE AEROBIC WASTE TREATMENT SYSTEM,
Multi-Flo, Inc., Dayton, Ohio. (Assignee)
J. R. Krebs, and T. G. Abele.
US Patent No 3,923,656, 6 p, 8 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 315-316, December 2, 1975.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Aerobic treatment, *Aeration, Water pollution control, Filtration, Aerobic bacteria, Domestic wastes, Septic tanks.

An aerobic package sewage treatment system is particularly adapted for domestic use. It is compact in configuration and releatively easy to install and operate, and thus especially adapted for use in isolated locations where service and maintenance are not readily available. A main holding tank is provided in which are suspended a number of porous bags which not only serve as filters but also provide a habitat for aerobic bacterial colonies and function as conduits for the final effluent as it passes from the holding tank. Sewage is delivered to the holding tank through a surge chamber positioned above the holding tank and an aerator mounted near the bottom of the holding tank draws air into the system to provide oxygen and produce an environment conducive to the propogation of aerobic bacteria while also ensuring a positive circulation within the holding tank. The effluent resulting from the aerobic decomposition of the waste material passes through the walls of the porous bags and flows upwardly within the bags into an effluent chamber. It then passes over the weir and out of a discharge outlet. The porous bags are formed of a non-corroding and nondeteriorating material such as a synthetic material and serve not only to remove all solids from the treated material, but also accommodate bacterial life on their outer surfaces. (Sinha-OEIS)
W76-04280

COMBINED SEPTIC TANK INLET PIPE SIGHT GLASS END PLUG AND TANK AERATOR SYSTEM.
K. F. Roser.
U.S. Patent No 3,923,657, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 316, December 2, 1975.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Septic tanks, Domestic wastes, Conduits, Aerobic treatment, *Aeration, Cleaning.
Identifiers: Sight glass.

The investigation provides an improved sight glass which incorporates an assembly permitting the aeration of the septic tank contents and the aeration means may be introduced into an existing septic tank system by way of the inlet pipe leading from the building basement to the underground septic tank. A port within the cylindrical housing permits water under pressure to impinge against the glasswindow to clean the window and flush inlet pipe to the septic tank. A thin tube air conduit projects through the cylindrical housing and has attached to it a coiled flexible plastic pipe which terminates in a porous aeration element. A conical piston is fixed to the aeration element and a vibrating air pump supplies air to the coiled flexible pipe and aeration element. The flow of sewage through the inlet pipe or the water under pressure in cleaning the sight glass drives the piston through the length of the pipe and into the septic tank where the air escaping from the porous aeration element provides aerobic action to the sewage within the tank and to the leach field downstream. (Sinha-OEIS)
W76-04281

APPARATUS FOR PROCESSING FLUSHING LIQUOR FROM A GAS MAIN OF COKE OVENS,
Otto (C.) and Co., G.m.b.H., Bochum (West Germany). (Assignee).
H. Ullrich.
U.S. Patent No 3,923,659, 4 p, 4 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 316, December 2, 1975.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, *Water quality control, Industrial wastes, Settling basins, Recycling, Reclaimed water, Treatment facilities, Heating, Equipment.

Flushing liquor from a gas main of a coke oven undergoes separation in a tank to obtain water which is essentially free of tar and solids and to obtain tar which is essentially free from water and solids. To accommodate the special requirements for the tar and solid separations, two separate groups of inclined settlement surfaces are provided in a common tank wherein solids are separated from the water and from the tar. The settlement surfaces of each group have bottom entries for liquid to be treated. The entrance ways to the two groups are at such heights that the entry to the water receiving group is placed above a tar-water phase boundary in the tank and the entry to the tar receiving group is placed below this boundary. Above both groups of inclined settlement surfaces are ajustable overflows which are adjusted to form the tar phase boundary at the desired elevation in the tank. Preferably, the two groups of inclined settlement surfaces are placed in a consecutive relationship and separated from one another by an inclined wall in the tank. To accelerate separation of water from the tar, indirect heating is provided below the group of settlement surfaces used to separate water from the tar. Along the long and short sides of the tank, side chambers are provided to receive clean water flowing from the overflows above the first and second groups to inclined settlement surfaces. A chamber for collecting the tar is provided in a similar way. (Sinha-OEIS)
W76-04282

MAGNETIC APPARATUS FOR TREATING LIQUIDS CONTAINING CALCAREOUS MATTER,
M. F. Kottmeier.
U.S. Patent No 3,923,660, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 317, December 2, 1975.

Descriptors: *Patents, *Waste water treatment, *Demineralization, *Water quality control, Water purification, *Calcium compounds, Hardness(Water), Separation techniques, Equipment.
Identifiers: Magnetic fields, *Magnets.

Mineral bearing water is treated magnetically by causing it to move in both an elongated path and a direct path past a magnetic field provided by a magnet array held in a number of elongated tubes supported in the flutes of a central fluted tube. The elongated path is provided by a helix surrounding the magnet array, and the direct path is provided by the central tube. The magnets arranged in the N-N and S-S relationship and the magnetic fields created are enhanced by separation of the like poles by non-ferrous material within the tubes supporting the magnets. A multiplicity of magnets are held in individual tubes holding a number of magnets with their poles in opposing relationship, each tube being held in the flute of the tube having a multiplicity of flutes, with the poles of the magnets in each tube aligned with the poles of the magnets in an adjacent tube, all of the aligned magnet poles being of like polarity to increase the flux density. (Sinha-OEIS)
W76-04283

FLUID PURIFICATION DEVICE,
For primary bibliographic entry see Field 5F.
W76-04285

REVERSE OSMOSIS APPARATUS,
United Kingdom Atomic Energy Authority, London (England). (Assignee).
For primary bibliographic entry see Field 3A.
W76-04286

APPARATUS FOR PHOTO-OXIDATION OF WATER,
Toray Industries, Inc., Tokyo (Japan). (Assignee).
M. Hirose, M. Otani, K. Yamada, N. Mitani, and K. Tanaka.
U.S. Patent No 3,924,139, 5 p, 15 fig, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 443, December 2, 1975.

Descriptors: *Patents, Water purification, *Water treatment, *Waste water treatment, Tertiary treatment, *Oxidation, *Ultraviolet radiation, Water pollution treatment, Water quality control.
Identifiers: *Photo-oxidation.

An improved photo-oxidation apparatus for purifying water has at least two reaction chambers each connected with each neighboring chamber through a passageway, and which has in each reaction chamber an ultarviolet light source dipped practically vertically into the water to be treated and fixed by holders placed above the surface of the water. The apparatus is also equipped with gas suppliers, placed near the bottom of each ultraviolet light source in order to agitate waste water in that vicinity. Through these gas suppliers gas, usually containing oxygen, is supplied. The apparatus is also equipped with inlets for oxidizing agents, catalysts or photosensitizers in at least two of these chambers. The object is to achieve efficient reaction by means of several reaction chambers, each separated from each neighboring chamber except for a small water passageway between them. The passageway prevents any significant back flow or reverse mixing while permitting thorough mixing to occur in each chamber. (Sinha-OEIS)
W76-04287

DISPOSAL OF EFFLUENT FROM A BEEF CATTLE FEEDLOT RUNOFF CONTROL HOLDING POND,
Agricultural Research Service, Lincoln, Nebr.
For primary bibliographic entry see Field 5E.
W76-04290

LOW SULFIDE UNHAIRING AND ITS ADVANTAGES FOR THE TANNER,
BASF Wyandotte Corp., Detroit, Mich.
H. F. Buettner.
The Leather Manufacturer, Vol. 91, No. 8, p 20-23, August, 1974.

Descriptors: *Sulfides, *Industrial wastes, *Tannery wastes, *Waste water treatment, Effluents, Lime, Biodegradation.
Identifiers: *Leather, Sodium sulfite liming.

Due to increased environmental concern, tanneries must now solve the problem of clarifying strongly toxic, sulfide-containing tannery effluents. Sulfide-free or low-sulfide unhairing systems are needed, due to the high maintenance and investment costs of factory owned effluent treatment plants, the high costs of discharging effluents into a municipal treatment plant, and strict regulations concerning sulfide content, BOD and general quality of the effluent. Many unhairing systems have been suggested and rejected for various reasons such as cost, insufficient opening of the collagen fiber system, or too severe opening of the hide structure. A reductive liming process is described which uses the BASF Wyandotte Corporation product Mollescal SF instead of sodium sulfide or sodium sulfhydrate in conjunction with hydrated lime. The effluent of Mollescal SF lime liquors contains almost no sulfide ions and the protein substances remaining can be easily removed by biodegradation. Leathers processed by the Mollescal SF method have much finer and tighter grain and less pronounced and more easily set out growth marks than the grain and growth marks of leather processed by standard sodium sulfite liming techniques. (Orr-FIRL)
W76-04292

OXIDATION DITCH TREATMENT OF ANAEROBIC LAGOON EFFLUENT OF DISTILLERY WASTE,
Walchan Coll. of Engineering. Sangli (India). Dept. of Civil Engineering.
B. S. Rao.
Journal of the Institution of Engineers (India), Vol. 54, No. 3, p 97-99, June, 1974. 1 fig, 2 tab, 9 ref.

Descriptors: *Oxidation, *Lagoons, *Anaerobic conditions, *Waste water treatment, Biochemical oxygen demand, Standards, Effluents, Capital costs, Operating costs, Irrigation, Industrial wastes.
Identifiers: Distillery waste waters, Bench scale models, Oxidation ditchs.

The Institute of Standards of India has issued a draft standard of a 100 mg/liter BOD limit for distillery waste water discharged into inland surface waters. Distillery wastes have been successfully treated in anaerobic lagoons and the lagoon effluent diluted six to eight times with fresh water and then used as irrigation water. However, it is now necessary to find a suitable treatment to dispose of the waste on land or in surface streams without the addition of fresh water because of a shortage of dilution water or a lack or irrigation facilities at some of the distilleries. A bench-scale model was used to study the treatement by oxidation ditch method of the effluent from anaerobic lagoons which provided the initial treatment of distillery wastes. The results of the experiment demonstrated that treatment of a lagoon effluent by oxidation ditch can reduce the BOD of the effluent to 100 mg/liter. An organic loading of 0.12 kg BOD/kg MLSS was found to be the optimum to achieve 98 percent BOD removal efficiency. The capital cost of constructing an oxidation ditch capable of treating a lagoon effluent quantity of 350,000 liters/day was estimated as Rs 300,000; the running expenditure was calculated to be Rs 20,000 per year. (Orr-FIRL)
W76-04293

TREATMENT OF WHEAT STARCH WASTE BY ACTIVATED SLUDGE (2) ON THE EFFECT OF PH AND BOD LOADING (KASSEI ODEI NI YORU KOMUGI DENPUN HAISUI NO SHORI (2) PH OYOBI FUKARYO NO EIKYO),
T. Fukada, S. Umemoto, K. Tada, and H. Kitamura.
Hyogo-ken Kogai Kenkyusho Hokoku, No 5, p 38-41, 1973. 5 fig, 1 tab, 13 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Food processing industry, Activated sludge, Biological oxygen demand, Sludge, Hydrogen ion concentration.
Identifiers: Sludge volume index(SVI).

Treatment of wheat starch wastes by the activated sludge process was studied. With a pH value of 5.5 to 7.0 in the mixed liquor, the suppression of growth of filamentous organisms was observed, and the sludge volume index (SVI) was relatively satisfactory. In the case of high waste concentration, one of the major causes of decreasing SVI was pH. The effect of BOD loading, and application of Katz's equation and Menten's equation were studied. It was assumed that if BOD loading was less than 0.40 kg/kg day, then the effluent BOD value was less than 100 ppm. Relationships between oxygen utilization rate and BOD concentration or removal were investigated. At the same BOD concentration, the oxygen utilization rate of the highly purified mixed liquor was low. (Murphy-FIRL)
W76-04294

ARIZONA RULES AND REGULATIONS FOR SEWERAGE SYSTEMS AND WASTE TREATMENT WORKS.
Arizona State Dept. of Health, Phoenix.
For primary bibliographic entry see Field 5G.
W76-04368

COLORADO REGULATIONS FOR EFFLUENT LIMITATIONS; TREATMENT WORKS SITE APPROVAL REGULATION; STORM SEWER DISCHARGE REGULATIONS.
Colorado Water Quality Control Commission, Denver.
For primary bibliographic entry see Field 2G.
W76-04375

CHEMICAL ANALYSIS AND PROCESS CLASSIFICATION OF CONSTITUENTS OF EFFLUENTS (ORGANIC NITROGEN IN ACTIVATED CARBON EFFLUENTS),
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W76-04387

BIOTIC CHANGES IN THE WILLIMANTIC/SHETUCKET RIVER ASSOCIATED WITH IMPROVEMENTS IN SEWAGE TREATMENT,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5C.
W76-04388

ANIMAL WASTE MANAGEMENT IN MODERN PRODUCTION SYSTEMS,
New York State Coll. of Agriculture and Life Science. Dept. of Poultry Science.
For primary bibliographic entry see Field 5G.
W76-04414

AN ASSESSMENT OF THE AGRICULTURAL AND PROCESSING WASTE PROBLEMS AND CONTROL IN WEST VIRGINIA,
West Virginia Univ., Morgantown. Agricultural Experiment Station.
For primary bibliographic entry see Field 5G.
W76-04415

TREATMENT AND DISPOSAL OF ANIMAL WASTES IN MASSACHUSETTS,
Massachusetts Univ., Amherst.
J. T. Clayton.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p 61-67.

Descriptors: *Farm wastes, *Massachusetts, *Waste treatment, *Waste disposal, Research and development, Aeration, Effluents, Nitrogen, Groundwater, Lagoons, Ponds, Design.
Identifiers: Land disposal.

In an attempt to provide usable engineering design information, studies of several components of treatment systems are being conducted. Under study are the following: (1) An extended aeration system of manure mixed with water to form a slurry. (2) The effects of disposal of effluent from the above mentioned system at a subsurface level in terms of chemical, microbiological, and physical properties of constructed profiles, as well as the degree of tertiary treatment in the soil. (3) Distribution of animal waste effluents within the soil with an orifice or nozzle that can reliably effect uniform discharge. (4) Flow of nitrogen through the soil with the purpose of establishing what effect adsorption of nitrogen by soil particles would have on nitrogen contamination of groundwater in the vicinity of waste stabilization ponds. (5) The effects of groundwater on the movement of nitrogen in soils adjacent to lagoons or ponds. (Merryman-East Central)

W76-04418

FEEDLOT WASTE DISPOSAL AND WATER POLLUTION,
Colorado State Univ., Fort Collins. Agricultural Extension Service.
For primary bibliographic entry see Field 5B.
W76-04419

POLLUTION-CONTROL TECHNIQUES AND REQUIREMENTS,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W76-04420

DAIRY WASTE STORAGE PONDS FOR SOIL-PLANT RECYCLING,
California Univ., Riverside. Agricultural Extension Service.
W. C. Fairbanks, E. H. Olson, and G. A. Hutton, Jr.
University of California, Agricultural Extension, Publication No. AXT-n88, November, 1972, 6 p, 3 fig.

Descriptors: *Dairy industry, *Waste storage, Irrigation, Design, *Liquid wastes, Storm runoff, Odor, Cleaning, Waste treatment, Waste disposal.
Identifiers: *Land disposal, *Pond management.

Along with the ultimate beneficial return to the land, waste storage ponds provide a system for collecting, settling, and storing liquified dairy manure and washwater for re-use in barn cleaning and manure transport. When ascertaining the desirability of the liquid-waste ponding system consider how it relates to the cow confinement system, manure transport, work simplification, waste management, neighborhood acceptance and expected performance in all weather conditions. The ways in which the dairy waste storage ponds may meet the requirements for storm runoff control are outlined. Design of a waste management facility should be based on cost, safety and performance. The aspects of the liquid-waste ponding system that are examined are: (1) pond layout, (2) pond volume calculation, (3) pond depth, (4) levees and slopes, (5) pond sealing, (6) pipes, (7) pumps, and (8) fencing. Pond management includes the practice of emptying and flushing the ponds at each irrigation. Manure waste water should not exceed 30 percent of the irrigation volume. The necessary equipment for such management is listed. Odor control and cleaning of the pond are also discussed. (Penrod-East Central)
W76-04421

CRITICAL WASTE PROBLEMS AHEAD,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 5E.
W76-04423

A STUDY OF A FULL-SCALE SWINE WASTE DISPOSAL SYSTEM,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
P. H. Jones, and N. K. Patni.
Water Research, Vol. 6, p 1425-1432, 1972. 8 fig, 1 tab, 4 ref.

Descriptors: *Farm wastes, *Hogs, *Oxidation lagoons, *Waste treatment, Biochemical oxygen demand, Chemical oxygen demand, Waste disposal, Odor.
Identifiers: Ditch mixed liquor, Organic carbon, Odor control.

A problem of disposal of large amounts of animal wastes arises when confinement livestock breeding is utilized. There is an increasing trend towards this method of breeding and the problem is magnified when land application of the manure produced is not feasible. Because of their simplicity and economy, oxidation ditches are being considered more often as a means of partially or completely stabilizing livestock wastes. Findings are reported on the biological efficiency of oxidation ditches in reducing organic carbon. The oxidation ditch was a satisfactory unit for treating swine wastes for the reduction of BOD and COD loads. If the manure is mixed with poorly biodegradable bedding material, it is desirable to screen the wastes for large solid materials before introducing them into the ditch. Foaming should be considered in the design of a unit, particularly when in-the-building oxidation ditches under slatted floors in the pens are used, as excessive foaming was often a serious problem. For odor control, better DO distribution in the entire mixed liquor mass is desirable. Two methods of achieving this are using extra rotors or using direct air injection into the ditch mixed liquor. (Penrod-East Central)
W76-04425

CHEMICAL COAGULATION OF FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
R. J. Smaus.
MS Thesis, May, 1972, 60 p, 25 fig, 7 tab, 23 ref.

Descriptors: *Farm wastes, *Waste treatment, *Feed lots, *Agricultural runoff, *Chemicals, *Coagulation, *Costs, Turbidity, Sludge, Color.
Identifiers: *Color reduction.

The treatment of feedlot runoff by chemical coagulation was evaluated, with color reduction as the prime goal. The removal of organic matter and other desirable effects were also anticipated. Alkalinity was important in the chemical coagulation process. Turbidity and apparent color can be reduced by the application of moderate amounts of coagulants, whereas the colloidal color, believed to be hydrophilic, requires large dosages of coagulant for significant removal. The reduction of the total solids, suspended solids, and COD may be related to the reduction of turbidity. Feedlot runoff can be clarified by coagulation using the common metallic coagulants. Estimated chemical costs of such treatment are in excess of $1.00 per 1000 gallons. From the chemical costs involved and the large volume of chemical sludge produced, chemical coagulation does not appear to be a practical method of treating this waste. (Cartmell-East Central)
W76-04426

FARM WASTE DISPOSAL.
Ministry of Agriculture, Fisheries and Food, Pinner (England).
For primary bibliographic entry see Field 5E.
W76-04427

MANURE HOLDING PONDS FOUND SELF-SEALING,
J. L. Meyer, E. Olson, and D. Baier.
California Agriculture, Vol. 26, No. 4, p 14-15, May, 1972.

Descriptors: *Farm wastes, *Farm lagoons, *Waste storage, Water pollution, *Poultry, *Dairy industry, *Waste water treatment, Salts, Sludge, Biochemical oxygen demand, Nitrogen, California.
Identifiers: *Manure holding ponds(Self sealing).

Findings in a study of waste pond operations are reported. In the past, waste waters from poultry and dairy operations flowed to stream beds where they became part of the stream. Improved practices are imperative, since such waste waters are high in BOD, nitrates, dissolved solids, offensive constituents, and bacteria. One alternative available to handle animal wastes is the use of manure waste ponds. A test was run on 17 ponds in California which represented a wide range of soil textures, water table depths, and age. Apparent anaerobic nitrogen losses of considerable magnitude occur under normal pond operation. Since much of manure dry solids is salt, ponds should be emptied frequently or whenever salt content reaches 2,900 ppm. After several months of use, levels of nitrate and salt in soil solutions from below ponds showed very small changes. There is a very low rate of water loss from manure ponds. Sludge which developed on each soil bottom had very low nitrate-nitrogen contents and very high BOD values. Seepage of water from the ponds amounted to only 1 mm per day. Soil solutions below the ponds had a lower concentration of all nutrients than adjacent well waters after 15 months. Thus artificial seals inside manure-laden reservoirs are not recommended. (East Central University)
W76-04428

GUIDELINES FOR CATTLE FEEDLOT DESIGN,
Montana State Univ., Bozeman. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W76-04430

REVIEW OF RESEARCH AND RECOMMENDATIONS ON ANIMAL WASTE MANAGEMENT CONTROL MEASURES FOR MONTANA WITH SPECIAL REFERENCE TO BEEF CATTLE FEEDLOTS,
Montana State Univ., Bozeman. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W76-04431

NEW WASTE TREATMENT SYSTEM IS USED FOR HOGS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
E. P. Taiganides.
American Farmer, Vol. 47, No. 2, p 6-7, February, 1972.

Descriptors: *Farm wastes, *Waste treatment, *Separation techniques, *Liquid wastes, *Solid wastes, Odor, Biochemical oxygen demand, Aeration, *Hogs.
Identifiers: *Flushing.

Although liquid systems have made it possible to mechanize manure handling to a greater extent than is possible with solid systems, new odor and water pollution problems have been created. Automated waste handling systems which do not create water or odor pollution will probably be in great demand in years to come. This study examined a treatment system in which flushing the manure out of the building played an important role. Flushing accomplished two things: (1) It prevented the release inside the building of noxious gases which affect the health and comfort of both animals and of the people working inside the building; (2) It ameliorated the problems of dust and odor and it automated manure removal. Flushing also enhanced the treatability of the manure in the aeration units outside the building by speeding up the liquification of the organic solids in the manure. At peak performance, an effluent of extremely high quality was produced. The BOD of the effluent was from 30-140 ppm and pH ranged from 6.5 to 8.4. There were no odors. The effluent was treated in an oxidation ditch, clarified, and recycled through the building as flushing water. The solids were screened out, aerated in an aerobic digestor, and stored before being pumped out for final disposal. There was trouble in getting the aerator to work properly but the problem was presumed to be in the wiring. Before a conclusion could be drawn on plant efficiency, its performance in freezing weather would have to be studied. (Kehl-East Central)
W76-04436

GLASS MANUFACTURING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04445

5E. Ultimate Disposal Of Wastes

INCINERATION DISPOSES OF REFINERY WASTES.
The Oil and Gas Journal, Vol 73, No 46, p 60-63, November 17, 1975. 4 fig, 1 tab.

Descriptors: *Waste water treatment, *Industrial wastes, Oil industry, *Oil wastes, *Incineration, Waste disposal, Ultimate disposal, Burning, Sludge, Oily water, Oil pollution.
Identifiers: Refinery wastes.

Stricter control of landfills, and land scarcity are forcing refineries to consider incineration for the disposal of oily sludges and wastes. Although modern production methods allow the production of oily sludges to be kept to a minimum, several sources of oily wastes persist. If on-site incineration is chosen, the feed stock should be segregated and equalized. Economizing with instrumentation or control systems should be avoided and heat recovery is often not practicable with current technology. Oily wastes should be dewatered before incineration by using a 'thickener', centrifuge, or rotary vacuum filter. Commercially available incinerators consist of a refractory-lined chamber, firing equipment, means of introducing wastes, a system for ash removal, and instrumentation. Each of the following incinerator designs is discussed: box furnaces; vortex incinerators; cyclone incinerators; rotating-hearth incinerators; rotary-kiln incinerators; multiple-hearth incinerators; and, fluidized-bed incinerators. (Orr-FIRL)
W76-04021

WATER POLLUTION AND ITS CONTROL AT OIL REFINERIES,
National Environmental Engineering Research Inst. Nagpur(India).
For primary bibliographic entry see Field 5D.
W76-04025

WASTE WATER TREATMENT BY GAS INTAKE APPARATUS (KITAI MAKIKOMISOCHI NI YORU HAISUI SHORI),
For primary bibliographic entry see Field 5D.
W76-04034

EXPERIENCES WITH THE OPERATION OF STEP SWING GRATES, AND PLANS FOR THE COMBINED INCINERATION OF DOMESTIC REFUSE AND SEWAGE SLUDGE (BISHERIGE BETRIEBSERFAHRUNGEN MIT STUFENSCHWENKROSTEN UND PLANUNGEN FUER KOMBINIERTE VERBRENNUNG VON MUELL UND KLAERSCHLAMM),
For primary bibliographic entry see Field 5D.
W76-04079

SPRAY RUNOFF DISPOSAL OF WASTE STABILIZATION POND EFFLUENT,
Ontario Ministry of the Environment, Toronto. Applied Science Section.
For primary bibliographic entry see Field 5D.
W76-04161

EVALUATION OF THE BARBER - COLMAN WETOX PROCESS FOR SEWAGE SLUDGE DISPOSAL,
Ontario Research Foundation, Toronto. Dept. of Environmental Chemistry.
For primary bibliographic entry see Field 5D.
W76-04164

DISPOSAL OF LIQUID WASTE BY POWELL DUFFRYN PROCESS.
For primary bibliographic entry see Field 5D.
W76-04188

PROCESS FOR CONDITIONING SEWAGE SLUDGES,
Rheinstahl A.G., Dortmund (West Germany). (Assignee)
For primary bibliographic entry see Field 5D.
W76-04269

DISPOSAL OF EFFLUENT FROM A BEEF CATTLE FEEDLOT RUNOFF CONTROL HOLDING POND,
Agricultural Research Service, Lincoln, Nebr.
J. A. Nienaber, C. B. Gilbertson, T. M. McCalla, and F. M. Kestner.
Transactions of the ASAE, Vol. 17, No. 2, p 375-378, March/April, 1974. 1 fig, 6 tab, 11 ref.

Descriptors: *Agricultural runoff, *Feed lots, *Waste disposal, *Nutrient removal, Water pollution control, Equations, Rainfall, Irrigation, Design criteria, Effluents, *Farm wastes, Waste water treatment.
Identifiers: Beef cattle feedlot runoff, Land application, Waste disposal systems.

A field study was performed to determine the minimum area required to dispose of feedlot runoff as affected by applied nutrients. Water and disposal area runoff control requirements are discussed. A minimum area of one-half acre disposal area per acre of feedlot did not impair crop production or cause pollutant accumulation. There was no discrimination by cattle grazing on the effluent treated areas. An equation for the disposal area in acres was given: the disposal area in acres equals the summation of estimated annual rainfall in inches x the size of the feedlot in acres, all divided by the average irrigation total in inches. (Orr-FIRL)
W76-04290

MICHIGAN LIQUID INDUSTRIAL WASTE DISPOSAL ACT.
For primary bibliographic entry see Field 5G.
W76-04380

UNITED STATES GEOLOGICAL SURVEY'S HYDROGEOLOGICAL RESEARCH PROGRAMS AND PLANS RELATED TO DISPOSAL OF RADIOACTIVE WASTE INTO GEOLOGIC FORMATIONS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W76-04411

PLANT NUTRIENT BUDGETS AND WASTE DISPOSAL,
Connecticut Agricultural Experiment Station, Storrs.
For primary bibliographic entry see Field 5C.
W76-04416

A PERSPECTIVE FOR CONNECTICUT,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 5B.
W76-04417

TREATMENT AND DISPOSAL OF ANIMAL WASTES IN MASSACHUSETTS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5D.
W76-04418

DAIRY WASTE STORAGE PONDS FOR SOIL-PLANT RECYCLING,
California Univ., Riverside. Agricultural Extension Service.
For primary bibliographic entry see Field 5D.
W76-04421

CRITICAL WASTE PROBLEMS AHEAD,
Kentucky Univ., Lexington.
I. J. Ross, B. J. Barfield, and H. E. Hamilton.
Livestock Breeder Journal, Vol. 15, p. 270-272, 274, July, 1972.

Descriptors: *Farm wastes, Livestock, Oxidation lagoons, *Agricultural wastes, *Waste disposal, Lagoons, Recycling, Waste treatment, Dehydration, Injection wells, Waste disposal wells.
Identifiers: *Waste management, Land disposal.

Agricultural waste management problems have been magnified by recent developments-- extension of the suburbs into farming areas, centralization of animal producing facilities, increased production, use of chemical fertilizers, and demand for processed food. Many new practices and concepts are being tested in an effort to solve these problems. Livestock waste pollution constitutes about 11 percent of all agricultural pollution. Land disposal of these wastes is the most widely used disposal method. Microbial digestion systems such as lagoons and oxidation ditches rank second. Other systems include dehydration to produce fertilizers, deep dispersal into drilled wells, and various methods of recycling. (Merryman-East Central)
W76-04423

A STUDY OF A FULL-SCALE SWINE WASTE DISPOSAL SYSTEM,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W76-04425

FARM WASTE DISPOSAL.
Ministry of Agriculture, Fisheries and Food, Pinner (England).
Short Term Leaflet 67, Amended 1973, 24 p, 4 tab.

Descriptors: *Waste disposal, *Waste treatment, *Farm wastes, *Aerobic conditions, Effluents, Anaerobic digestion, Livestock, Legal aspects, Pathogenic bacteria, Irrigation.
Identifiers: *United Kingdom, *Land disposal.

When planning a waste disposal system it is important to know how much and what kind of material will have to be handled. There are basically 5 systems of manure handling: (1) solid, (2) semi-solid, (3) liquid slurry, (4) organic irrigation, and (5) discharge into a public sewer. Aerobic oxidation treatment systems include (1) the oxidation ditch, (2) the high rate biological filter tower and (3) the surface aerator. In addition to manure, silage effluent, washing down water, rainwater, and other water used in the milking process must be considered when designing farm buildings. In utilization of farm manure, it is normally recommended that diluted cow slurry (1 part manure: 2 parts water) should be applied at up to 15,000 gal. per acre per annum in three separate applications. The legal aspects of waste disposal are clarified by the Rivers Acts of 1951 and 1961, the Water Resources Act of 1963, the Public Health Acts of 1961 and 1969, and the Agriculture Act of 1956. Infectious organisms of concern are the salmonella group of bacteria and brucellosis. The proper waste disposal system for a particular farm is dependent upon the type of land, acreage and cropping policy, type of housing, scale of enterprise, costs, river pollution, nuisance and health possibility of hazards, and comfort of stock and men. Care should be taken not to agitate or empty storage tanks when the wind direction will carry smells to houses, operate spray guns in periods of

high wind, irrigate when the land is saturated, or drain effluent directly into a water course. (Battles-East Central)
W76-04427

FOREST LAND FOR MANURE DISPOSAL.
Poultry Digest, Vol. 30, p. 553, November, 1971.

Descriptors: *Farm wastes, *Waste disposal, *Forest management, *Nitrogen, Liquid wastes, Groundwater, Water pollution, Application rates.
Identifiers: Tanker spreader.

Liquid manure was applied with a tractor-drawn tank spreader across a 30-ft swath in a white pine plantation. It dried quickly and was dispersed by rains within two months. Flies were not attracted and the trees used the nitrogen effectively. Application rates must be governed to avoid nitrogen build-up in groundwater. (East Central University)
W76-04433

HOW TO DISPOSE OF MANURE AND STAY OUT OF COURT,
E. D. Anderson.
Farm Quarterly, Vol. 27, No. 4, p 52-56, 1972.

Descriptors: *Farm wastes, Waste disposal, *Legal aspects, *Feed lots, *Cattle, *Dairy industry, Costs, Irrigation, United States, Canada, Hogs.
Identifiers: Land disposal.

All states and Canadian provinces now prohibit discharge of untreated livestock manures from feedlots to surface or underground waters. Consult the applicable law before starting or enlarging an operation. Note the distances to downwind neighbors. Adequate spreading areas should be owned or held under long-term lease. Suggestions and cost estimates are given for beef, dairy, and swine operations. (East Central University)
W76-04435

5F. Water Treatment and Quality Alteration

ACID MINE DRAINAGE WATER MADE FIT TO DRINK.
For primary bibliographic entry see Field 5D.
W76-04090

COUNTERCURRENT FLOW OSMOTIC PROCESSES FOR THE PRODUCTION OF SOLUTIONS HAVING A HIGH OSMOTIC PRESSURE,
University of the Negev, Beersheba (Israel). Research and Development Authority.
For primary bibliographic entry see Field 3A.
W76-04185

A CENTRIFUGAL METHOD FOR THE EVALUATION OF POLYMER MEMBRANES FOR REVERSE OSMOSIS,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 5D.
W76-04186

TREATMENT OF SEA WATER PRODUCES HIGH-QUALITY REACTOR COOLANT,
Southern California Edison Co., Los Angeles, Calif.
For primary bibliographic entry see Field 3A.
W76-04262

FLUID PURIFICATION DEVICE,
W. P. Reid.
U.S. Patent No 3,923,663, 5 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 318, December 2, 1975.

Descriptors: *Patents, *Water purification, *Water treatment, *Water quality control, Ultraviolet radiation, Disinfection, Filtration, Thin films, Waste water treatment.
Identifiers: Sterilization.

A unique combination of a fluid filter unit and fluid serilizing unit in a single housing is utilized with the filter unit surrounding the ultraviolet lamp, and a spaced tube of reflecting or non-reflecting materials which cooperate to provide a flow channel for conducting the fluid to be irradiated along the lamp envelope. The outer surface of the tube has an extremely thin film of hermetically sealed fluorinated ethylene propylene to prevent contamination and accumulation of scale or other impurities and yet permit transmission of a relatively large amount of ultarviolet rays. The lamp assembly is removably mounted within the body and extends through a reflector tube which not only conveys the fluid in a thin walled column over the lamp, but also reflects the ultraviolet rays back and forth through the fluid to increase irradiation. A tubular filter unit is removably fitted within the body and surrounds the reflector tube in a manner to communicate fluid passing through to one end of the reflector tube where it is conveyed along the length of the lamp to an outlet. (Sinha-OEIS)
W76-04285

APPARATUS FOR PHOTO-OXIDATION OF WATER,
Toray Industries, Inc., Tokyo (Japan). (Assignee).
For primary bibliographic entry see Field 5D.
W76-04287

POLYMER ADSORPTION AND ITS EFFECT ON THE STABILITY OF HYDROPHOBIC COLLOIDS. II. THE FLOCCULATION PROCESS AS STUDIED WITH THE SILVER IODIDE-POLYVINYL ALCOHOL SYSTEM,
Agricultural Univ., Wageningen (Netherlands). Lab. for Physical and Colloidal Chemistry.
G. J. Fleer, and J. Lyklema.
Journal of Colloid and Interface Science, Vol 46, No 1, p 1-12, January, 1974. 10 fig, 1 tab, 22 ref.

Descriptors: *Polymers, *Adsorption, *Colloids, *Flocculation, Mixing, Coagulation, Chemical reactions, *Water treatment, *Adsorption.
Identifiers: Polyvinyl alcohol, Silver iodide.

During invesigation of the interaction between hydrophobic colloids and polymers, the flocculation of silver iodide sol by polyvinyl alcohol was studied. The extent of flocculation depends on the method of mixing of sol and polymer. The flocculation is most effective if equal amounts of nearly completely covered AgI particles and uncovered particles are mixed. The apparent irreversibility of the adsorption of polymer molecules is essential for the dependence of the flocculation on the mixing order. A certain critical amount of salt is needed to bring about flocculation; thus the flocculation process may be referred to as sensitization. The critical salt concentration decreases with increasing valency of the counterion, approximately in the ratio 100:10:1 for KNO3, Ca(NO3)2 and La(NO 3)3. The salts reduce the Stern potential and compress the diffuse double layer to such an extent that the attachment of adsorbed loops on other particles is no longer electrostatically inhibited. The flocculation efficiency increases with increasing molecular weight and acetate content of the polymer. The better the polymeric flocculant, the less critical the way of mixing. The aggregation between polymer covered and uncovered particles is a bimolecular process. Silver iodide sediments formed upon flocculation with polyvinyl alcohol are loose and open; their volume decreases slightly upon standing. On the other hand, silver iodide sediments obtained by coagulation with salts have a higher volume during the first hours after their formation, but this volume decreases gradually. (Murphy-FIRL)
W76-04295

NATIONAL SAFE DRINKING WATER STRATEGY -- ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Water Supply.
Draft Strategy Document, May, 1975. 83 p, 2 fig, 6 tab.

Descriptors: *Administrative agencies, *Potable water, *Public health, Legal aspects, Water law, Regulation, Federal government, State governments, Standards, Technology, Economic impact, Water pollution, Water pollution control, Local governments, Governmental interrelations, Environmental effects, Safety, Water quality control, Water pollution treatment, Water purification, Pollution abatement.
Identifiers: *Administrative regulations, *Safe Drinking Water Act.

This document outlines the strategy used by the Environmental Protection Agency (EPA) in implementing the Safe Drinking Water Act (SDWA). The report states that it is the policy of EPA to approach the problem of substandard drinking water on a step-by-step basis giving highest priority to matters of public health. The strategy emphasizes participation and decision-making on a local level. The overall goal of the program is to assure that the public has safe drinking water but the strategy recognizes that this goal cannot be acomplished overnight. Reasonable compromises will have to be made among all environmental programs, and where goals among the programs conflict, tradeoffs may be required. The report states the following program objectives and outlines the strategy related to the implementation of each objective: to insure an effective Federal-State partnership in the implementation of SDWA; to complete research, development, and demonstration projects which will provide technical information needed to accomplish the purposes of the Act; to carry out enforcement of the provisions of the Act; and to encourage consumer participation in implementation of the Act. (Nursey-Florida)
W76-04354

5G. Water Quality Control

EVALUATION OF AGRICULTURAL ADJUSTMENT TO IRRIGATION WATER SALINITY: A CASE STUDY FOR PINAL COUNTY, ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3C.
W76-04004

THE ECONOMICS OF SEWERAGE PRICING AND INVESTMENT POLICIES: THE MADISON METROPOLITAN SEWERAGE DISTRICT,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
N. W. Bouwes, and D. W. Bromley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 503, $6.00 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1975. 127 p, 16 fig, 17 tab, 80 ref. OWRT B-087-WIS(2). 14-31-0001-4139.

Descriptors: *Sewerage, *Alternative planning, Water demand, *Pricing, *Investment, Water requirements, Water utilization, Mathematical studies, Prices, Economics, *Marginal costs, *Economic efficiency, *Water rates, Water policy, Decision making, Wisconsin.
Identifiers: Madison Metropolitan Sewerage District(Wis).

This study was undertaken in an attemp to address the shortcomings associated with management techniques of public utilities, in particular, pricing and investment policies. An examination of existing policies has revealed an absence of economic considerations in water resource management

philosophy. Present philosophy appears to consider water use insensitive to price; and consequently, has substituted water 'requirement' approach for the economist's 'demand' approach. Prices are use primarily for financing, purposes, rather than a tool for managing demand. Likewise, investment considerations do not appear to be predicated upon economic concepts; this is attributed in part to improper pricing, and other circumstances such as satisfying grant provisions which require 20-year time horizons by the grantee in their investment planning. These practices may be a result of the utility's emphasis on non-economic issues, or the belief that the benefits to be obtained from incorporating an economic approach to their decision making would not justify the costs. In any event, it is apparent that a cognizance must be made of the implications associated with alternative management practices. This then becomes the objective of this study--to make available a tool based upon the economics interactions of a system which allows management to evaluate possible alternative management policies.
W76-04008

SUMP DESIGN FOR OIL/WATER SEPARATORS,
Empresa Nacional del Petroleo, Concon, Chile.
For primary bibliographic entry see Field 5D.
W76-04022

CONTROL OF POLLUTION FROM PETROLEUM REFINERIES,
For primary bibliographic entry see Field 5D.
W76-04023

PRESENT SITUATION OF ALKALI WASTEWATER NEUTRALIZATION EQUIPMENT USED FOR STACK GAS DESULFURIZATION (HAIEN DATSURYUYO ARUKARI HAIEKI CHUWA SOCHI RIYO NO JISSAI NI TSUITE),
For primary bibliographic entry see Field 5D.
W76-04030

WASTE WATER PROBLEMS OF DESIZING WITH RESPECT TO LEGISLATIVE MEASURES (ABWASSERPROBLEME BEIM ENTSCHLICHTEN UNTER BERUECKSICHTIGUNG GESETZGERBERISCHER MASSNAHMEN),
For primary bibliographic entry see Field 5D.
W76-04031

ENVIRONMENTAL CONCERNS AND DECISIONS FOR THE MINING INUDSTRY,
Pennsylvania State Univ., University Park.
R. Venkataramani.
Journal of the Institution of Engineers (India), Vol. 54, No. MM2, p 45-49, March, 1974. 1 fig, 3 tab, 2 ref.

Descriptors: *Mining, *Industrial wastes, *Environmental effects, *Water pollution control, *Acid mine water, *Mine wastes, Groundwater, Engineering, Drainage, Water pollution sources.
Identifiers: Mine drainage.

The mining industry is responsible for water pollution resulting from mine drainage and the disruption of groundwater flow and normal drainage patterns. Mining and related operations cause air pollution by releasing particulate and gaseous substances to the atmosphere. Land damage from underground mining is due primarily to subsidence and ground movement. Destruction of surface topographies and soil conditions are the results of surface mining. These environmental problems often have engineering solutions. Techniques include: control at the source by prevention or reduction of acid mine drainage; treatment of polluted waters; dispersion or dilution of pollutants; and, permanent containment or isolation of polluted waters. A strong commitment is needed by the government, the mining industry, and the public to spend adequate funds for environmental protection. (Orr-FIRL)
W76-04093

CANADA WATER ACT, ANNUAL REPORT - 1974 - 1975.
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 6E.
W76-04152

CANADA CENTRE FOR INLAND WATERS - 1973.
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W76-04155

MIZUSHIMA OIL SOILL,
Environmental Protection Service, Ottawa (Ontario). Environmental Emergency Branch.
C. W. Nicol.
Information Services, Environment Canada. July 1975, 8 p, 10 photos. English and French.

Descriptors: *Oil spills, *Water pollution, Fishing, Landfills, Beaches, *Oil pollution, Research and development, Environmental effects, Equipment, Asia.
Identifiers: *Inland Sea of Japan, *Mizushima Oil Refinery, Cleanup operations, Public concern.

As an observer the author was sent to Japan, to observe cleanup measures following an oil spill in the Inland Sea of Japan, December 18, 1974. The situation was of special interest to Canada because of the similarities between the Inland Sea of Japan and Canada's Georgia Strait - Vancouver Island area. After observing cleanup operations it is concluded that research into containment, recovery and disposal of oil must continue. A brief discussion of Canadian preparations for environmental emergencies is included in the report. (Environment Canada)
W76-04159

WASTEWATER TECHNOLOGY CENTRE, CANADA CENTRE FOR INLAND WATERS, BURLINGTON, ONTARIO, ANNUAL REPORT 1974.
Environmental Protection Service, Ottawa (Ontario).
Technology Development Branch, (1975). 36 p, 17 fig, 3 tab, 27 ref.

Descriptors: *Technology, *Programs, *Projects, *Water quality control, *Water pollution control, Water quality, Sewage disposal, Sewage treatment, Research facilities, Research and development, Federal government, *Canada.
Identifiers: *Technical development programs.

Reports are presented from various sections within the Wastewater Technology Centre on their activities throughout the year 1974. The function of each station in helping to carry out water pollution control programs for industrial and municipal wastewaters across Canada is described. The major reports are from the Technology Development and Demonstration Division, the Process Development Section, the Laboratory Services Section and the Facilities Services Section. (Environment Canada)
W76-04173

SEMINAR ON FISH PROCESSING PLANT EFFLUENT TREATMENT AND GUIDELINES, 1974.
Environmental Protection Service, Ottawa (Ontario).
Economic and Technical Review Report EPS 3-WP-75-1, February 1975. 474 p, 55 fig, 109 tab, 33 ref, 3 append.

Descriptors: *Food processing industry, Fish, Pollutants, Wastes, Industries, Fish handling facilities, Canneries, Water pollution sources, *Industrial wastes, Treatment, Effluents, *Conferences, *Waste water treatment, *Water quality standards.

This publication contains the reports given at the Seminar on Fish Processing Plant Effluent Treatment and Guidelines held in Vancouver British Columbia, January 15-16, 1974, Moncton, New Brunswick, April 24-25, 1974, and St. John's, Newfoundland, May 14-15, 1974. The seminar was sponsored by Environment Canada with the cooperation of the Fisheries Association of British Columbia, the New Brunswick Fish Packers Association, and the Fisheries Association of Newfoundland and Labrador. (Environment Canada)
W76-04174

IRRIGATION RETURN FLOW, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5B.
W76-04230

FISH PROCESSING OPERATIONS LIQUID EFFLUENT GUIDELINES.
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
Regulations, Codes and Protocols Report EPS 1-WP-75-1, June 1975, Canada Gazette, Part I, May 31, 1975, p 2213-2218.

Descriptors: *Waste water treatment, Discharge(Water), Storm water, Solid wastes, *Canada, Measurement, *Water quality standards.
Identifiers: *Fish processing, Fish meal, Liquid effluents, Bloodwater, Process water, Domestic sewage, Outfalls, Stickwater.

Requirements are presented for controlling liquid effluent resulting from fish processing or fish meal operations. Regulations are listed for sewage and drainage systems, treatment of liquid effluents from fish processing, offal disposal and liquid effluents from fish meal, sampling and metering, outfalls, and advanced treatment. Explanations and suggested methods of complying with these requirements are included. (Environment Canada)
W76-04240

WATER POLLUTION CONTROL DIRECTORATE PUBLICATIONS.
Environmental Protection Service, Ottawa (Ontario).
June 1975. 21 p. English and French.

Descriptors: *Publications, *Bibliographies, Pollution abatement, Cities, Technology, Research and development, *Canada, Information exchange.
Identifiers: *Canada-Ontario Agreement.

Included in this list of publications are reports published jointly by Environmental Canada and the Ontario Ministry of the Environment under the Canada - Ontario On Great Lakes Water Quality. These reports describe research projects funded by the Agreement's Research Program for the Abatement of Municipal Pollution. The projects are either carried out in-house by Environment Canada and the Ontario Ministry of the Environment, or through contracts with municipalities, research institutions and industrial organizations. Details on ordering procedures are included. (Environment Canada)
W76-04253

REVIEW OF CANADIAN DESIGN PRACTICE AND COMPARISON OF URBAN HYDROLOGIC MODELS.
Maclaren (James F.) Ltd., Willowdale (Ontario).
Canada-Ontario Agreement on the Great Lakes Water Quality, Research Report No. 26, Training and Technology Transfer Division (Water), Environmental Protection Services, Environment Canada, Ottawa, Canada, October 1975. 212 p, 48 fig, 28 tab, append.

Descriptors: *Storm drains, *Drainage, Flooding, Frost, *Model studies, Hydrology, Graphical analysis, Statistical methods, Runoff, Peak discharge, Hydrographs, Design, Methodology, Reviews, *Surveys, *Canada, *Sewers, Cities.
Identifiers: Questionnaires, Rational methods.

A questionnaire was distributed to municipalities across Canada requexting details of their storm sewer design practice with emphasis on policies, problems with flooding and frost conditions, and attitudes towards new trends in urban drainage management. Replies from 37 municipalities from Vancouver to Halifax were received and analyzed. Five urban hydrologic models were evaluated. These were: 1. The Storm Water Management Model (SWMM), 2. The University of Cincinnati Model (UCUR), 3. The Transport and Road Research Model (RRL), 4. The Queen's University Urban Runoff Model (QUURM), 5. The Proprietray Dorsch Consult Hydrograph Volume Method Model (HVM). These models were evaluated using recorded data from 4 residential test areas from the United States and Canada, using from 10 to 14 different storm events on each area. The accuracy and consistency of the models were assessed by means of graphical and statistical comparison of both peak, runoff volumes and the complete hydrograph for the computed and recorded hydrographs. The peak flows calculated by the Rational Method were also compared with the measured flows. All models performed satisfactorily when applied to small test areas and all models gave more consistent results than the Rational Method. (Environment Canada)
W76-04254

CANADA CENTRE FOR INLAND WATERS, 1974.
Canada Centre for Inland Waters, Burlington (Ontario).
1975. 138 p, 63 fig, 11 tab, 2 append.

Descriptors: *Great Lakes, *Projects, *Programs, *Research and development, Water quality, Instrumentation, Engineering, Toxicity, Asbestos, Waste water treatment.
Identifiers: *Annual reports, Hydrographic surveys, Great Lakes Water Quality Agreement, Environmental assessment.

Projects and programs undertaken by the Canada Centre for Inland Waters, during the year 1974 are outlined. Reports of activities from the Environmental Management Service, which include the Inland Waters Directorate, the Environmental Protection Service ant the Fisheries and Marine Service are presented. A major share of CCIW activities continued to be directed toward the implementation of programs required by the 1972 Canada - United States Great Lakes Water Quality Agreement. Projects outside the Great Lakes Basin were concentrated in areas of instrumentation development, engineering and suport services, environmetal toxicity, and wastewater treatment. (Environment Canada)
W76-04258

WATER TRANSPORT OF WOOD: THE CURRENT SITUATION,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
J. Karau.
Economic and Technical Review Report EPS 3-WP-75-3, October 1975. 72 p, 11 fig, 9 tab, 32 ref, 2 append.

Descriptors: *Water quality, Environment, Pollutants, Environmental effects, Erosion, Fish, Recreation facilities, Fishing, Water pollution control, Costs, Pulp wastes, Jurisdiction, Governments, Pulp and paper industry, *Canada, Transportation, Lumbering.
Identifiers: *Woodfloatage, *Water transportation(Wood), Wood.

A study was made of woodfloatage in Eastern Canada in relation to the national scene. Information was obtained from people working in the logging industry, a literature review, a case study (Ottawa River). The agencies and bodies directly involved or interested in woodfloatage, and those conducting research on the environmental effects of the logging industry. A general overview of the woodfloatage situation in Canada, and a basis for the consideration of the problems associated with floating wood are presented. Recommendations are made for both immediate and long term situations. (Environment Canada)
W76-04261

OIL SPILL CONTAINING BOOM,
J. H. Neal.
US Patent No 3,921,407, 3 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1668-1669, November 25, 1975.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Water pollution control, Floating, Buoyancy, Separation techniques.
Identifiers: *Booms, Floating booms.

A boom for containing an oil spill on a body of water is described. The boom consists of a band of longitudinally flexible, water permeable, oil-impermeable material and light weight buoyant, spaced vertical spars. The spars extend across the full width of the band are attached to it adjacent it upper and lower edges. This arrangement is found to have good vertical stability. The spars, which can each be formed of a hollow plastic pipe partially filled with foamed plastic, are light in weight and form an integral part of the boom. The boom can quickly be deployed by unreeling it directly from a storage drum. The spar is self-righting. That is, when dropped onto a body of water, it will automatically bring itself to the vertical position. This may be achieved by weighting the lower end of the spar and providing slots in the tube wall. When the spar hits the water, the weighted lower end submerges; water enters the lower end and drives the air out of the interior of the tube or casing. The weighted end functions to maintain the spar in a generally vertical position. (Sinha-OEIS)
W76-04263

SEA-WATER OIL SPILL CLEANING SYSTEM,
P. J. Strain.
US Patent No 3,922,225, 5 p, 16 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1940, November 25, 1975.

Descriptors: *Patents, *Oil pollution, *Oil spills, Water pollution, *Water pollution control, Separation techniques, Ships, Pollution abatement.
Identifiers: *Oil wastes recovery, Major oil spills.

The invention consists of a funnel or collecting box and conduit conveying system in association with large pollution ships in which the sea level oil is flowed by gravity or else suction-pumped from the sea with as little water as possible in a first separating step and then further separated in a second separating step by flow straight through a main separation tube extending from bow to stern and amidship with baffling means to direct oil off to starboard and port into oil separation tanks. If it is not desired to fill the tanks of the control ship of if they are already filled or if such tanks are not provided the baffled flow-through system can be utilized to by-pass separated oil to waiting tankers. It is expected that a ship suitably equipped may be capable of cleaning the sea after a major oil spill of crude, bunker C or diesel oil at the rate of at least 1,000 tons per hour as against present methods which deal with approximately 30 tons per hour. In such a cleaning operation means may be provided whereby the oil spill may be contained or fenced in. Thus oil may be pushed and accumulated in the aarea of the oil-removing or control ship. (Sinha-OEIS)
W76-04271

FLOATING BOOM HAVING ROTATABLE FLOAT ELEMENTS,
Pacific Pollution Control, Inc., Emeryville, Calif. (Assignee)
N. D. Tanksley.
US Patent No 3,922,860, 6 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 60, December 2, 1975.

Descriptors: *Patents, *Oil pollution, Water pollution, *Water pollution control, Water quality control, Barriers, Floating, Pollution abatement.
Identifiers: Floating booms, Containment, Deployment.

The floating boom includes an elongated partition and a number of float means mounted to the partition at periodic intervals over the length. Each float means includes a pair of float elements placed on either side of the partition. The float elements are rotatably mounted to the float for rotational movement to and from a deployed position and a relatively rotated stored position. The float elements are formed to enable a reduction in the overall bulk of the boom when the float elements are in the stored position. The float elements are mounted to the remainder of the float in a manner causing the combination buoyancy and gravity forces to bias the float elements to the deployed position. The partition is formed as a flexible member and the float means are mounted to the partition for flexure of the partition. In the stored position the flexible elongated sheet-like partition is folded back and forth upon itself and the float means are positioned between the folds of the partition and the rotable plate-like float elements are rotated on the float means parallel to and between adjacent folds of the partition. A retainer holds the boom in the folded position and is released to deploy the boom. The partition is pulled in a direction along its length to distend the folds of the partition and free the float elements for rotation to the deployed position. (Sinha-OEIS)
W76-04272

FLOATING MARINE BARRAGE,
A. Grihangne.
US Patent No 3,922,861, 4 p, 11 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 61, December 2, 1975.

Descriptors: *Patents, *Oil pollution, Oil spills, Water pollution, *Water pollution control, Water quality control, Barriers, Floating, Buoyancy, Pollution abatement.
Identifiers: Inflation(Air), Containment.

A floating marine barrage of adjustable draught is comprised of a single, ballasted, flexible tube having a cross-section which assumes the shape of an inverted tear drop when inflated. The tube has an upper buoyance compartment and a narrower ballasted lower end and at least one air inlet at one of the ends. The amount of air blown into the tube allows its immersion to be adjusted. The production is economical as it is manufactured from a single web of airtight flexible material closed edge to edge on itself. It can be stored by winding it on a horizontal drum. The tear drop equilibrium shape assumed by the air tube depends both on the amount of air blown into the barrage and the linear density of the ballast secured to the lower edge. The user has the possibility of regulating the height of the emergent portion of the barrage and consequently its draught thereby enabling optimum adjustment depending upon the state of the water

level and the intensity of the wind. The barrage is equipped with metallic ballast plates which are regularly spaced and positioned in sandwich formation at the joint of the two edges of the flexible sheet. (Sinha-OEIS)
W76-04273

FLOATING CONTAINING VESSLES OR DAMS FOR TRAPPING LIQUID POLLUTANTS,
J. Vidilles.
US Patent No 3,922,862, 4 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 61, December 2, 1975.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Water pollution control, Liquid wastes, Barriers, Floating, Separation techniques, Pollution abatement.
Identifiers: Floating barriers, Containment, Towing.

A floating containing vessel is provided for confining slicks of liquid pollutants. The vessel or dam comprises a flexible skirt connected at its upper portion to a float which provides vuoyancy to the vessel, and at its lower portion to a ballast. The skirt forms an enclosure wherein the pollutants collect and the depth of the skirt varies from a maximum at the maximum interior position of the enclosure to a minimum at the towing ends of the vessel which define the entrance to the enclosure. The ballast is utilized as a towing means for towing the containing vessel or dam. (Sinha-OEIS)
W76-04274

OIL SKIMMER WITH LEAD FLOAT AND HINGED WEIR,
A. J. Crisafulli.
U.S. Patent No 3,923,661, 4 p, 4 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 941, No 1, p 317-318, December 2, 1975.

Descriptors: *Patents, *Oil pollution, *Water pollution, *Water quality control, Skimming, Oil spills, Weirs, Overflow, Waves(Water), Water pollution control, Separation techniques.

A two-part skimming device for removing a layer of oil or other floating pollutants from the surface of a body of water is relatively small so that it can be transported easily. One part is a generally U-shaped flotation or pontoon unit. The other part is a combined collecting and pumping unit and has a hinged mounted weir plate and lead float to control the position of the weir in relation to the surface of the water. An adjustable mounting for the collecting and pumping unit includes pockets in the flotation unit receiving threaded bolt members which in turn are received in threaded apertures in part of the supporting structure for the weir plate. This aids in varying, in gradual steps, the vertical position of the weir. The lead float is connected to the hinged weir plate and provides 'fine' adjustment to variations in wave height. A self-contained power unit is provided to operate the pump and associated discharge structure, and connecting and conduit means effectively contain the gathered pollutants. (Sinha-OEIS)
W76-04284

IGNITION AND COMBUSTION IN SITU OF OIL FROM WRECKED OIL TANKERS: SMALL SCALE BURNING TESTS CARRIED OUT AT THE RPE,
Rocket Propulsion Establishment, Wescott (England).
J. Diederichsen, A. R. Hall, and P. T. Hinde.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 988, $4.00 in paper copy, $2.25 in microfiche. Technical Memorandum No 616, July 1972. 45 p, 11 fig, 4 tab, 11 ref, 7 append.

Descriptors: *Oil spills, *Ships, *Burning, *Oil pollution, Water pollution, Water pollution control, Laboratory tests, Winds, Waste disposal.
Identifiers: *Oil tankers, Tanks, Tanker accidents, Burning tests, Burning rates.

The effect of the size and position of venting apertures on the burning rate of crude oil in model tanks has been determined. One side aperture and one lid aperture were used in all tests, only their size and relative positions being changed. The effect of wind speed on the burning rate was also investigated, burnings being performed in still air and in blower-generated winds of about 6 and 11 m/s. Tanks of three different sizes were used, the largest being 1 sq m plan cross-sectional area, in an attempt to predict from the burning rates found in small scale tests those to be expected in a much larger tank. The tanks were water cooled on the bottom and on one side to simulate conditions at sea. Some empirical extrapolations and scaling rules have been obtained which provide an estimate of the probable burning rate in ship-sized tanks under various conditions of wind and venting. (Sims-ISWS)
W76-04312

A DISPERSION CURVE STUDY OF MODEL DREDGE SPOIL BASINS,
Texas A and M Univ., College Station. Dept. of Civil Engineering; and Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
For primary bibliographic entry see Field 5B.
W76-04321

THE PROTECTION OF THE ENVIRONMENT AND WORLD PUBLIC ORDER: SOME RECENT DEVELOPMENTS,
Yale Univ., New Haven, Conn. School of Law.
For primary bibliographic entry see Field 6G.
W76-04329

SYSTEMS DESCRIPTION OF THE U.S. COAST GUARD MARITIME ENVIRONMENTAL PROTECTION PROGRAM,
G. P. Wright, and D. G. Olson.
In: Designing Water Pollution Detection Systems, p 1-31, Ballinger Publishing Co., Cambridge, Mass., 1974. 31 p, 6 fig, 3 tab, 4 ref.

Descriptors: *Oil spills, Ships, *Inter-agency cooperation, *Pollution abatement, Administrative agencies, Comprehensive planning, Coordination, International waters, Navigable waters, Harbors, Ultraviolet radiation, Infrared radiation, Temperature, Costs, Coast Guard regulations, Oily water, Oil wastes, Oil pollution, Management, Standards, Water management(Applied), Federal government, Jurisdiction, Adoption of practices, Water pollution control.
Identifiers: *National Oil and Hazardous Substance Pollution Contingency Plan, Detection(Pollution), *National Response Team, Water Quality Improvement Act of 1970, Environmental Protection Agency, Oil Pollution Act of 1961, Federal Water Pollution Control Act Amendments of 1972, Milford Haven.

The United States Coast Guard is one of a number of federal agencies and departments that have been created to deal with the growing problem of oil--and other hazardous substances--polluting American ports, waterways, and the high seas. In this capacity, the Coast Guard has four main objectives: (1) enforcement of antipollution laws; (2) regulation of equipment and procedures to prevent pollution from ships; (3) development of response capabilities to minimize pollution once a spill occurs; and (4) establishment of a surveillance system utilizing the latest in pollution detection techniques. As an example of recent efforts, this article examines Coast Guard use of planes equipped with ultraviolet and infrared sensors. Since oil pollution at sea is often wilfull, as opposed to in port where it is usually accidental, such remote techniques are increasingly important to pollution enforcement. The Coast Guard's role as a member of the National Response Team created as part of the National Contingency Plan is also examined. The team serves as the body of planning and preparedness prior to a pollution spill, and as a co-ordinator and advisor when activated. (Parrish-Florida)
W76-04330

A SURVEY OF REMEDIES (TO WATER POLLUTION AND WATER SCARCITY PROBLEMS).
Stanford Environmental Law Society, Calif.
In: Interstate Environmental Problems, p 85-125, Stanford Law School, Standford, Calif., (1974). 41 p, 171 ref.

Descriptors: *Remedies, *Water control quality, *Abatement, *Surface waters, California, Public health, National Water Commission, Civil law, Costs, Rivers and Harbors Act, Eminent domain, Federal government, State governments, Administrative agencies, Interstate compacts, Interstate commissions, Rivers, Basins, Tennessee Valley Authority, Legal aspects, Standards, Water zoning, US Water Resources Council.
Identifiers: *Tahoe-Truckee Sanitation Agency(TTSA), *Citizen suits, *Fish and Game Department, *Federal Water Pollution Control Act(FWPCA), Amendments of 1972, Refuse Act of 1899, Water boards, National Environmental Policy Act of 1969(NEPA), Environmental Quality Act, Nuisance actions.

Citizens with water-related problems have a very broad spectrum of administrative, judicial and political remedies from which to choose. Local enforcement agencies, such as Fish and Game Departments and Public Health Departments, generally offer the quickest relief. Some problems, however, because of their complex nature, require the citizen to look either to state or federal agencies. A number of states have taken advantage of the 1972 Amendments to the Federal Water Pollution Control Act which allows them to administer their own waste discharge permit systems. Federal involvement in water control also includes the Environmental Protection Agency (EPA), the Council of Environmental Quality (CEQ), the Army Corps of Engineers, and the Water Resources Council. Sometimes the role of the federal government is one of an ally to the environmentalist, sometimes it is one of indifference, and sometimes that role is the very cause of the environmental problem. Concerned citizens can also consider bringing civil or even criminal actions against polluters under the various state and federal pollution acts. (Parrish-Florida)
W76-04331

COMPENSATION FOR OIL POLLUTION DAMAGE RESULTING FROM EXPLORATION AND EXPLOITATION OF HYDROCARBONS IN THE SEABED,
Compagnie Francaise des Petroles, Paris (France). Dept. of Law.
For primary bibliographic entry see Field 6E.
W76-04333

WATER POLLUTION CONTROL IN ALASKA: THE ALASKA ENVIRONMENTAL CONSERVATION ACT OF 1971,
Tennessee Univ. at Nashville.
L. L. Laska, and G. C. Fant.
UCLA - Alaska Law Rev., Vol 4, No 4, p 263-293 (1975). 31 p, 164 ref, 1 append.

Descriptors: *Law enforcement, *Alaska, *Legislation, *Water pollution control, *Conservation, Legal aspects, Standards, State government, Penalties(Legal), Jurisdiction, State jurisdiction, Regulation, Natural resources, Water resources, Water law, Water pollution, Water pollution effects, Water pollution abatement, Economics, Economic impact, Social impact, Water quality, Water quality standards, Water quality control, Pollutants.

Identifiers: *Alaska Environmental Conservation Act of 1971, Environmental policy, Administrative regulations, Injunctive relief.

tThe Alaska Environmental Conservation Act of 1971 broadly defines protected waters and actionable pollution, giving the Department of Environmental Conservation extensive pollution control powers. The Department's power includes jurisdiction over municipalities as well as private polluters. Through its statutory provisions, the Department has generated classification standards which require the maintenance of existing conditions where they are superior to specific legally established standards unless it can be demonstrated that a change is justifiable and that such change will not preclude present and anticipated use of water. The regulations also require the highest degree of practicable treatment of all discharges. The Act contains what are regarded as tough prohibition and penalty provisions and represents a comprehensive pollution control program far superior to most current state programs. (Nursey-Florida)
W76-04340

AWWA PRINCIPLES OF WATER RESOURCES POLICY (POLICY STATEMENT OF AMERICAN WATER WORKS ASSOCIATION).
American Water Works Association, Denver, Colo.
American Water Works Association Journal, Vol 67, No 8, p A20-A22, August, 1975. 3 p.

Descriptors: *Governmental interrelations, *Water resources development, *Water works, *Coordination, *Water quality control, Legal aspects, Water law, Governments, State governments, Federal governments, Local governments, Water resources, Potable water, Water pollution sources, Water pollution effects, Water pollution abatement, Water quality, Utilities, Public health, Water utilization, Environmental effects, Economic impact, Social impact, Ecosystems.

This policy statement, representing the official viewpoint of the American Water Works Association (AWWA), is based on two premises: that the primary objective of water resource policy should be the maintenance of an adequate supply of high quality water; and that the responsibility for water resource projects should rest with private interests or section of government closest to the people benefited. A number of corollaries stem from these premises, including the idea that priorities for water source development should be assigned on the basis of the possible contribution the souce could make to the social and economic welfare of the region, and the effects it could have on regional hydrology and ecology. Responsibility for pollution control should rest with those who return waste products to the waters. The role of the federal government should be to support and cooperate with local efforts, rather than to preempt them. The major role, however, in developing, controlling and policing water resources the AWWA would assign to the states, with a single agency established in each state to provide comprehensive coordinated policies and programs. (Nursey-Florida)
W76-04342

THE CALIFORNIA COASTAL ZONE CONSERVATION ACT OF 1972 (PROPOSITION 20) AND COMPARABLE LAND USE LIMITATIONS AFFECTING THE MINERAL INDUSTRY IN OTHER STATES,
Chaplin Petroleum Co., Forth Worth, Tex.
For primary bibliographic entry see Field 6E.
W76-04345

PRIVATE INFLUENCE ON ENVIRONMENTAL POLICY: THE CASE OF THE NATIONAL INDUSTRIAL POLLUTION CONTROL COUNCIL,
State Univ. of New York Coll. at Cortland. Dept. of Political Science.
For primary bibliographic entry see Field 6G.
W76-04346

INTERNATIONAL LAW AND NUCLEAR TEST EXPLOSIONS ON THE HIGH SEAS,
New York Univ., N.Y. Center for International Studies.
For primary bibliographic entry see Field 6E.
W76-04350

POTENTIAL HEALTH HAZARDS AND THE BURDEN OF PROOF IN ENVIRONMENTAL ACTIONS: THE IMPLICATIONS OF RESERVE MINING.
For primary bibliographic entry see Field 6E.
W76-04351

SALTING THE EARTH,
Worldwatch Inst., Washington, D.C.
For primary bibliographic entry see Field 3C.
W76-04352

THE NEEDS FOR WATER QUALITY MODELS ON AGRICULTURAL WATERSHEDS,
Southeast Environmental Research Lab., Athens, Ga.
For primary bibliographic entry see Field 5B.
W76-04353

NATIONAL SAFE DRINKING WATER STRATEGY -- ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Water Supply.
For primary bibliographic entry see Field 5F.
W76-04354

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION ACT.
Alaska State Dept. of Environmental Conservation, Juneau.
In: 1973 BNA Environmental Rep. 706:0101-05 (Alas. Laws 1971, as amended 1972). 5 p.

Descriptors: *Penalties(Legal), *Alaska, *Water pollution control, *Water quality standards, *Permits, *Environmental control, Water pollution, Water quality, Legislation, Regulation, Legal aspects, Sewage disposal, Oil pollution, Oil wastes, Damages, Water conservation, Water resources, Hazards.
Identifiers: Hazardous substances, Absolute liability, Administrative regulations, Injunctive relief.

The Alaska Department of Environmental Conservation has jurisdiction to prevent and abate the pollution of the waters of the state. The department shall establish: (1) water pollution control plans; (2) pollution standards; (3) quality and purity standards; (4) plans for pollution disposal; and (5) waste disposal permits and permit procedures. The statute prohibits unauthorized discharges of sewage, oil or petroleum products, and vessel ballast water when pollution may result. Any such violations may result in the imposition of fines and/or imprisonment. Any vessel in violation of the statute may be detained and searched by an authorized officer. Furthermore, a person whose violation of the statute results in the death of fish, animals or vegetation, or injures the environment in other ways, shall be liable to the state for damages. Finally, a person having control over a hazardous substance which enters in or upon the waters of the state shall likewise be held strictly liable for damages to persons or property caused by such a discharge. The department is further authorized to seek search warrants to investigate suspected sources of pollution. (Welch-Florida)
W76-04365

ALASKA WATER QUALITY STANDARDS.
In: 1973 BNA Environmental Rep. 706:0501-05 (Alas. Ad. Code (AAC)). Title 18, Environ. Conserv., Ch 70, 1972). 5 p, 1 tab.

Descriptors: *Classification, *Alaska, *Water pollution control, *Legislation, *Water quality standards, Water quality control, Water pollution, Water pollution treatment, Water quality, Legal aspects, Administration, Administrative agencies, Administrative decisions, Environmental control, Water resources, Water law, Quality control, Public health, Sewege treatment.
Identifiers: *Water use classifications.

The water quality standards herein for the state of Alaska shall apply to all waters of the states. Seven water use classifications are designated along eith water quality criteria applicable to each. In determinaing the appropriate water quality criteria for any waters, the Department of Environmental Conservation shall consider the following: (1) if the waters have more than one classification, then the most stringent water quality criteria shall apply; and (2) if a tributary water receives sewage waste disposal, then the most stringent water criteria applicable to either the tributary water or the confluence water shall apply to the tributary water. Secondary treatment is required for all sewage and industrial wastes unless studies approved by the department and the Environmental Protection Agency show that the water quality standards can be met by primary treatment. Any application to the department for a certificate showing a proposed activity of the applicant will not violate applicable water quality standards shall be subjected to public hearings. Any violation of these standards or regulations may result in either fines or imprisonment or both. (Welch-Florida)
W76-04366

ARIZONA WATER POLLUTION CONTROL LAW.
Arizona State Dept. of Health, Phoenix. Environmental Health Service.
In: 1973 BNA Environmental Rep. 711:0101-06 (Ariz. Rev. Stats. Title 36, Water Pol. Contr., Ch. 16, 1967, as amended 1971). 6 p.

Descriptors: *Arizona, *Water pollution control, *Legislation, *Water pollution treatment, *Waste water disposal, Water permits, Water pollution, Water quality, Water quality control, Water quality standards, Legal aspects, Pollution abatement, Federal Water Pollution Control Act, State Governments, Administration, Administrative agencies, Administrative decisions, Sewerage, Water.
Identifiers: *Administrative regulations.

The Arizona Department of Health and Arizona Water Quality Control Council shall adopt and amend reasonable standards of quality for the waters of the state for the prevention and abatement pollution. No single standard has been set up, but the council shall have power to set up a variable standard which relates to the amount or degree of pollutants that are permitted to be discharged into the state's waters following criteria established by the Federal Water Pollution Control Act, and other variables related to public health and to the extent of pollution resulting from different activities. The statute prohibits any discharge or location of wastes which would be likely to result in pollution of any state water, including those within Indian tribal reservations. The Department of Health requires the submission of a permit for any construction or extension of any disposal or treatment system. The statute further provides for injunctive relief to prevent or halt any acts or practices which are in violation of the statute. (Welch-Florida)
W76-04367

ARIZONA RULES AND REGULATIONS FOR SEWERAGE SYSTEMS AND WASTE TREATMENT WORKS.
Arizona State Dept. of Health, Phoenix.
In: 1971 BNA Environmental Rep. 711:0501-03 (Ariz. Rules and Regs. Dept. Health). 3 p.

Descriptors: *Arizona, *Sewage treatment, *Sewerage, *Waste water treatment, *Waste water(Pollution), Waste disposal, Waste water disposal, Wastes, Water pollution, Regulation, Administrative agencies, Water pollution control, Water pollution treatment, Water quality, Environmental control, Environmental sanitation, Treatment facilities, State governments, Administration, Industrial wastes.
Identifiers: *Administrative regulations.

The Arizona Department of Health has prescribed the rules and regulations applicable to any sewage or industrial waste disposal made into any of the waters or lands of the state. No discharges are permitted that are determined by the department to be detrimental to the quality of the receiving body of water or land, or which are prejudicial to the health of persons who may be affected by the resulting environmental condition. The use of cesspools is prohibited and septic tanks must meet quality criteria before they can be used. Any construction or extension of sewerage systems must be approved by the department after an application sets out sufficient planning and engineering specifications. All such waste treatment works must equal or exceed the design criteria specified by state regulation. All such completed treatment works are subject to inspection by designated department representatives; and works officers shall be notified of any unsatisfactory conditions along with recommendations for correction. The rules further regulate any pollution risks which might occur because of sewers and nearby water lines. (Welch-Florida)
W76-04368

CALIFORNIA WATER POLLUTION CONTROL LAWS.
California State Water Resources Control Board, Sacramento.
In: 1973 BNA Environmental Rep. 721:0101-27 (Calif. Water Code). 27 p.

Descriptors: *Permits, *California, *Water pollution control, *Legislation, *Water quality control, Water quality standards, Regulation, Water pollution treatment, Waste water disposal, Water pollution, Legal aspects, Pollution abatement, Federal Water Pollution Control Act, Sewage, Administrative decisions, Sewage treatment, Waste disposal, Water quality, Water treatment.
Identifiers: Administrative regulations, *Clean Water Bond Law(Calif), Injunctive relief.

The state of California has organized a State Water Quality Control Board which, along with Regional Water Quality Control Boards, shall formulate state policy for water quality control. Activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest reasonable water quality. Whenever a regional board finds that discharge is taking or is going to take place in violation of state water quality standards, the board may, to prevent such violation, use: (1) administrative remedies by regional and state boards; (2) judicial review and enforcement; (3) summary judicial abatement; and (4) civil monetary remedies. Provisions for compliance with the Federal Water Pollution Control Act as amended in 1972 are accepted, and a fund established providing state assistance to public agencies to aid construction of waste treatment facilities and facilities to reclaim waste water and to convey reclaimed water. The board also seeks to encourage use of reclaimed water to aid in the development of a new basic water supply. Finally the statute provides for: (1) special water quality standards; (2) the Clean Water Bond Law of 1970; and (3) regulation of transportation and disposal of liquid waste. (Welch-Florida)
W76-04369

REQUIREMENTS AND RESPONSIBILITIES OF THE STATE WATER RESOURCES CONTROL (REGULATIONS FOR IMPLEMENTATION OF THE ENVIRONMENTAL QUALITY ACT OF 1970).
California State Water Resources Control Board, Sacramento.
In: 1974 BNA Environmental Rep. 721:0536-44 (Calif. Public Resources Code Section 21082).

Descriptors: *California, *Environmental effects, *Federal Water Pollution Control Act, *Decision-making, *Water quality control, Environmental control, Administrative agencies, Administration, Legal review, Legislation, Water resources development, Adoption of practices, Administrative decisions, State governments, Water quality standards, Regulation.
Identifiers: *Environmental impact report.

In order to assure the orderly implementation of the state Environmental Quality Control Act of 1970 (CEQA), California has promulgated regulations prescribing the procedures to be followed by state and regional boards authorized to implement the Act. The major source of information for board decision-making will be the environmental impact report (EIR), which will set forth detailed statements concerning the environmental impact of any proposed project. When evaluating an EIR, agency boards are directed to give major consideration to the environmental damage a project may cause. Other specified activities may be initiated by the state or local boards without the preparation of an EIR. As to EIR's actually submitted, procedural requirements are set forth concerning their review. These regulations also set forth the procedures to be followed in implementing Section 208 of the Federal Water Pollution Control Act (FWPCA). Under this section, areas having substantial water quality problems must be identified and designated by the state governor. The regulations further prescribe the duties of the governor to the state board, and provide a detailed list of the criteria to be considered by the board in determining and designating Section 208 areas. (Hoffman-Florida)
W76-04370

COLORADO WATER QUALITY CONTROL ACT.
Colorado Dept. of Health, Denver.
In: 1974 BNA Environmental Rep. 726:0101-12 (Colo. Rev. Stats. 1963, Amended by S. 86 and S. 91, 1974). 12 p.

Descriptors: *Colorado, *Water pollution control, *Water quality control, *Water quality standards, *Classification, Effluents, Discharge(Water), Waste water(Pollution), Law enforcement, Permits, Regulation, Monitoring, Control systems, Data collection, Penalties, (Legal), Non-structural alternatives, Water pollution.
Identifiers: *Public hearings.

Recognizing that the pollution of state waters constitutes a public menace, Colorado has created the Water Quality Control Commission for the purpose of developing comprehensive programs for the prevention and control of water pollution. To aid in the development of such programs, the Commission shall: (1) classify state waters; (2) promulgate water quality standards and regulations; (3) set up a permit system for regulating effluent discharges; and (4) perform other specified duties. The Water Quality Control Act also sets up procedures designed to assure the enforcement of programs instituted by the Commission. The division given enforcement authority shall be responsible for assuring that owners or operators of effluent discharging facilities monitor, record and report all information needed to assure compliance with the Act. Because any regulations or actions taken by the Commission will have a pervasive impact on many individuals, the Act requires procedural requirements pertaining to notice and public hearings be followed before any action becomes final. Appropriate civil and criminal penalties are provided to help insure compliance with all provisions of the Act. (Hoffman-Florida)
W76-04371

COLORADO REGULATIONS FOR THE STATE DISCHARGE PERMIT SYSTEM.
Colorado Water Quality Control Commission, Denver.
In: 1975 BNA Environmental Rep. 726:0501-09 (Colo. Water Qual. Control Regs. 1975). 9 p, 1 append.

Descriptors: *Control, *Federal Water Pollution Control Act, *Water quality control, *Monitoring, *Permits, Administration, Decision making, Administrative agencies, Discharge(Water), Discharge measurement, Legislation, Regulation, Legal aspects, State governments, Waste water(Pollution).
Identifiers: Permit systems, Public notice and hearings, *Colorado Water Quality Act.

In conformity with the Federal Water Pollution Control Act Amendments of 1972, these regulations will aids in the implementation of the Colorado Water Quality Control Act. Although the regulation provide for certain statutory exemptions, they generally require that a permit be obtained before any pollutant is discharged into state waters. Procedures that must be followed in applying for a permit are presented, along with the criteria that must be considered by the agency authorized to issue the permit. If a permit is granted, it shall not be for a period to exceed five years, and it shall be subject to certain prohibitions and conditions stipulated in the Act. To insure that the conditions of the permit are followed, the appropriate issuing agency is authorized to monitor the discharge activities of the permit holder. Because of the public interest in the issuance of permits, prescribed public notice must be satisfied before a permit will be granted. In cases where a total volume of discharge exceeds 500,000 gallons daily, prescribed fact sheets must be prepared by the agency and made available to the public. Finally, the Act sets forth qualifications for individuals who desire to be a member of the Water Quality Control Commission, the agency authorized to implement the Water Quality Control Act. (Hoffman-Florida)
W76-04372

COLORADO WATER QUALITY STANDARDS.
Colorado Water Quality Control Commission, Denver.
In: 1974 BNA Environmental Rep 726: 1001-26 (Colo. Water Qual. Control Comm'n Water Qual. Stand) 26 p, 12 tab, 2 append.

Descriptors: *Colorado, *Classification, *Water quality standards, *Water types, *Water quality control, Recreation, Water properties, Water management, Bodies of water, Analytical techniques, Flow profiles, Effluents, Municipal wastes, Regulation, State jurisdiction, Legal aspects, Industrial wastes.
Identifiers: Antidegradation, *Water classification.

In order to reach the goals of the Water Quality Control Act of 1973, the Water Quality Control Commission has promulgated standards to serve as the basis for the classification of state waters. Several basic standards are presented which are applicable to all state waters. These standards generally require that the waters be free from floating debris and from substances attributable to municipal or industrail discharges. The standards also provide that waters be classified as either A1, A2, B1, B2, Class A waters are those that are safe for all purposes for which raw water is generally used, including primary contact recreation such as

swimming. Class B waters are those that may not be used for primary contact recreation, although they may be used for other class A purposes. To aid in the classification of waters, these standards contain the requirements for several different aspects of classification including: zone of passage; flow criteria and exceptions; analytical testing; antidegradation statement; and the degree of treatment.Finally, an appendix is presented which contains a list of all waters in the State of Colorado and their classification. (Hoffman-Florida)
W76-04373

COLORADO STANDARDS FOR THE DISCHARGE OF WASTES.
Colorado Water Pollution Control Commission, Denver.
In: 1974 BNA Environmental Rep 726: 1101-03 (Colo. Water Pollution Control Comm'n Standards for the Discharge of Wastes, 1973).

Descriptors: *Colorado, *Water quality standards, *Wastewater disposal, Analytical techniques, *Sampling, Water quality control, Legislation, State jurisdication, Oil, Chlorine, Hydrogen ion concentration, Suspended solids, Turbidity, Water properties, Impaired water quality, Water pollution effects, Adoption of practices.
Identifiers: *Fecal count limits.

To enhance the quality of water within the state, the Colorado Water Pollution Control Commission has promulgated standards to control the discharge of water. Apart from a few statutory exemptions, the water quality standards are applicable to all waste water discharges into state waters. These technical standards, which are presented in detail, concern such waste water factors as: settleable solids; suspended solids; turbidity; pH limits; fecal coliform counts; dissolved oxygen limits; residual chlorine limits; and oil and grease limits. The standards provide that the American Public Health Association's Standard Methods for the Examination of Water and Wastewater shall be the controlling reference when devising tests and analytical procedures to measure compliance with wastewater stnadards. Finally the standards provide that the analysis of wastewater discharges shall be based on six hour composite samples. (Hoffman-Florida)
W76-04374

HAWAII ENVIRONMENTAL QUALITY LAW.
Hawaii State Office of Environment Quality Control, Honolulu.
In: 1974 BNA Environmental Rep. 756: 0101-02 (Ha. Enviorn. Laws and Regs., Vol. 1, Title 19, Health Ch. 342, Environ. Qual. Part III; as amended by Laws 1973 Ch. 118). 2 p.

Descriptors: *Hawaii, *Water quality control, *Effluents, *Permits, *Pollution abarement, Research and development, Waste water(Pollution), Control systems, Monitoring, Non-structural alternatives, Penalties(Legal), Law enforcement, Water quality standards, Equipment, Water pollution, Water pollution control, Discharge(Water).
Identifiers: Water pollution control equipment, Permit systems.

In an effort to improve the environmental quality in Hawaii, the administrator of the state Office of Envioronmental Quality Control has the power to take specified steps to prevent, control, or abate water pollution. Under the authority of this statute, the administrator may: (1) establish water quality standards and regulations; (2) initiate research programs for the purpose of analyzing the causes and effects of water pollution; (3) distribute educational information to the public concerning various aspects of water pollution; (4) require a permit and instpection system for pollution control equipment; and (5) require detailed information from the operator or owner of any source of effluent discharge. The statute also gives the administrator the authority to make grants, appropriated by the legislature, to local governmental units for the purpose of constructiong or improving sewage treatment works. No local agency may apply for these grants, however, unless they meet the specified requirements. Finally, the statute described who is eligible to be a member of the state Environmental Quality Control Board. (Hoffman-Florida)
W76-04376

KANSAS UNDERGROUND STORAGE REGULATIONS.
Kansas State Board of Health, Topeka.
In: 1973 BNA Environmental Rep. 781:0541 (Kansas Stat., Ch. 28, State Health Regs., Art. 13, secs. 28-13-1 thru 28-13-11 1966).

Descriptors: *Underground storage, *Kansas, *Discharge(Water), *Industrial wastes, *Storage requirements, Storage, Reservoir storage, Water management(Applied), Water supply, Underground storage, Waste storage, Storage capacity, Water wells, Subsurface waters, Riddance(Legal aspects), Surface waters, Administrative agencies, Storage tanks, Standards.
Identifiers: *Administrative regulations.

The Kansas State Board of Health herein regulates the construction and use of underground storage reservoirs, disposable water and surface ponds for the confinement, storage and disposal of industrial fluid other than those resulting from oil field activities. Plans and specifications for storage of fluid or gaseous products in underground reservoirs must be submitted to the Board for approval prior to construction or development. Any operator of such an underground reservoir must maintain a permanent record of the type and quantity of all products stored therein. The storage or disposal of wastewater in any surface pond or disposal well must also be approved by the Board and upon abandoment of the pond the operator must dispose of any such wastewater in a manner acceptable to the Kansas State Dept. of Health. All applicants must supply any information, plans or specifications that may be needed by the Board to adequately review the project.
W76-04377

KANSAS WATER POLLUTION CONTROL LAWS.
Kansas State Board of Health, Topeka. Div. of Enviornmental Health.
1975 BNA Environmental Rep. 781: 0101-09 (Kan. Stat. Ann. Sections 65-161 thru 65-171 as amended 1974) 9 p.

Descriptors: *Kansas, *Permits, *Water pollution control , *Legislation, *Water quality control, *Water quality, Water quality standards, Waste water treatment, Sewage, Sewage treatment, Sewage disposal, Administrative agencies, Discharge(Water), Regulation, State governments, Legal aspects, Control, Control systems, Penalties(Legal), Standards.
Identifiers: *Mercury pollution.

The Kansas State Departmet of Health and Environment herein sets forth the Water Pollution Control Laws of that state. The Act requires the Department encompass within its rules and powers a broad range of investigatory and regulatory duties, including: (1) regulation of sewage plants, and investigation of complaints therein; (2) issuance of discharge permits; (3) scheduling of fees to defray costs of administering the water pollution control permit system; (4) administration of penalties to sewage plants for discharges without a permit or for failure to comply with Department requirements; and administration of rules and regulations to protect state waters from pollution by oil and gas storage reservoirs and from mercury discharges. The Act further provides that reasonable access to facilities subject to this act be made available to any authorized representative of the Department and that strict standards concerning oil and gas be followed. including regulation of possible pollution, drilling and disposal. The Act provides for criminal prosecution and for payment of fines by those found in violation of the Act. (Welch-Florida)
W76-04378

KANSAS WATER QUALITY CRITERIA.
1974 BNA Environmental Rep 781:0501-04 (Kan Stat Ann secs. 65-165 thru 65-171 (d) 1973) as amended 1973. 4 p, 1 map, 1 chart.

Descriptors: *Water quality standards, *Kansas, *Classification, *Water quality, *Surface waters, Administrative decisions, Beneficial use, Swimming, Recreation, Waterfowl, Wildlife, Agriculture, Fishing, Boating, Streamflow, Reservoirs, Lakes, Aquatic life, Surface runoff, Bacteria, Dissolved oxygen, Temperature, Ammonia, Waste disposal, Turbidity.

Kansas has promulgated water quality criteria for all surface waters of the state. Representative provisions include: (1) water uses shall be grouped into Class A waters and Class B waters; (2) water treatment and control of municipal and industrial wastes shall be used to reduce organic load, oil, grease, solids, alkali, acids, toxic materials, color and turbidity, taste and odor products, and other deleterious materials to the lowest practicable level; (3) flow criteria are established to determine when water quality criteria shall apply; (4) zones of passage of continuous water routes of the volume, area, and quality necessary to allow passage of free-swimming and drifting organisms without significant effects on their populations must be provided in streams, reservoirs and lakes whereever mixing zones are allowed; and (5) all watercourses which reach zero natural flow annually are exempted from water use classification and the application of water quality criteria except certain specified watercourses and those that can be expected to support acquatic wildlife. Finally, specific criteria are set forth for controlling bacteria, dissolved oxygen content, temperature, pH factor, ammonia, oil and grease, solids, turbidity, taste and odor producing substances, color, and toxic substances. (Segall-Florida)
W76-04379

MICHIGAN LIQUID INDUSTRIAL WASTE DISPOSAL ACT.
In: 1972 BNA Environmental Rep. 811:0121-22 (Act 136, Mich. Pub. Acts of 1969). 2 p.

Descriptors: *Transportation, *Michigan, *Waste disposal, *Liquid wastes, *Industrial wastes, Wastes, Investigation, Inspections, Oil, Soil stabilization, Drains, Ponds, Streams, Surface waters, Groundwater, Water pollution, Jurisdiction.
Identifiers: Surety bond.

In Michigan, before engaging in the business of removing liquid industrial wastes from the premisis of another, a person shall obtain a license from the state water resources commission. A license fee of $100 and a surety bond of $15,000 for residents of the state and $30,000 for non-residents must accompany a license application. If the commission is satisfied that the applicant has the qualifications, experience, reputation and equipment to perform the services in a manner not detrimental to the public interest, it then issues a license to the applicant. All trucks or other vehicles used to transport or carry liquid industrial wastes must carry a license from the commission verifying inspection by a commission representative or law enforcement agent. The tank must be kept tightly closed in transit to prevent the escape of contents and odors. Finally, the licensee must keep records of all trips where pickup, hauling, or disposal of wastes are involved and must not dispose of wastes onto or into the ground except at

locations specifically approved by the commission. (SegallyFlorida)
W76-04380

MICHIGAN OIL SPILLAGE REGULATIONS.
In: 1973 BNA Environmental Rep 811:0621-23 (Mich Ad Code Part 5, 1973). 3 p.

Descriptors: *Michigan, Structural design, Check structures, *Oil pollution, *Oil spills, *Water pollution control, Legal aspects, Water law, State governments, Legislation, Oil industry, Water pollution, Water pollution sources, Pollutants, Water quality, Water quality control, Engineering structures, Salts, Equipment.
Identifiers: Administrative regulations, Booms.

Michigan has enacted regulations which require that, before oil is on-loaded or off-loaded through a conduit to or from a vessel on waters of the state at an oil storage facility, booms and associated equipment must be available at the site to prevent the spread of spilled oil. Similarly, an oil storage facility adjacent to a watercourse must have such equipment available. During the on-loading or off-loading of oil at such facilities, adequate surveillance of the loading operation shall be maintained so that any oil spillage can be immediately detected. Furthermore, a storage or use area at an oil storage facility must be structurally enclosed so that no oil can escape through sewers, drains, or otherwise to surface or ground waters. Similar structural enclosures must be constructed at any on-land facility in which salt in liquid form is stored. Finally, any on-land facility used for the storage of polluting material must be structurally enclosed pursuant to these regulations. (Nursey-Florida)
W76-04381

MICHIGAN CLEANING AGENTS REGULATIONS.
In: 1973 BNA Environmental Rep 811:0661-62 (Mich Ad Code Part 6, 1972). 2 p.

Descriptors: *Michigan, *Administrative agencies, *Regulation, *Chemical wastes, *Water pollution control, Water law, Legal aspects, State governments, Legislation, Detergents, Water pollution, Water pollution sources, Pollutants, Water quality, Water quality control, Phosphates, Adoption of practices, Administrative decisions.
Identifiers: Administrative regulations.

Michigan has adopted regulations requiring a person engaged in the sale or distribution of cleaning agents or water conditioners to file a written report stating the percentage of phosphorus by weight for each product. In addition, before any person may sell or distribute a new, reformulated or altered cleaning agent or water conditioner, such person must file the following: (1) a written statement that the product is not likely to cause unlawful pollution; (2) a written statement setting forth the percentage of phosphorus by weight in the product; (3) any additional requested information which is necessary to protect the waters of the state from unlawful pollution. Finally, written statements pursuant to this regulation may be contested by the commission, with notice and a hearing required in accordance with these rules before any determination of contested issues are made. (Nursey-Florida)
W76-04382

MONTANA REGULATION ON WATER POLLUTION FROM LIVESTOCK FEEDING.
Montana Board of Health and Environmental Sciences, Helena.
In: 1973 BNA Environmental Rep 831:0541-42 (Mont Bd of Health and Environ Sciences Regs for the Control of Water and Air Pollution from Confined Livestock Feeding, 1972). 2 p.

Descriptors: *Montana, *Administrative agencies, *Farm wastes, *Water pollution control, *Permits, Legal aspects, Water law, State governments, Legislation, Livestock, Water pollution sources, Pollutants, Organic wastes, Water quality, Water quality control, Farm management, Regulation.
Identifiers: Administrative regulations.

The Montana Board of Health and Environmental Sciences has adopted regulations implementing the Water Pollution Control Act and Clean Air Act of Montana as they pertain to confined livestock feeding operations. Under the regulations, the operation of any proposed new or enlarged confined livestock feeding operation which may discharge drainage water or manure to a state water must obtain a livestock waste control facility permit before the operation is started or an existing operation is enlarged. Furthermore, the operation of any currently existing confined livestock feeding operation which may discharge drainage water or manure to a state water must apply to the Department of Health and Environmental Sciences for a livestock waste control facility permit within 24 months of the effective date of this regulation. Such permit, temporary permit or variance may be granted subject to stated conditions; and may be revoked if it was procured by misrepresentation, or the operator has violated a condition of the permit, or the operator has not provided needed additional or improved facilities to prevent pollution within such reasonable time as is allowed by the Department. (Nursey-Florida)
W76-04383

NEBRASKA ENVIRONMENTAL PROTECTION ACT.
Nebraska State Dept. of Environmental Control, Lincoln.
In: 1973 BNA Environmental Rep. 836:0101-16 (Neb. Rev. Stats. Reissue 1943, 1971 Supp. as amended by LB 1435, Laws 1972, and LB 194, LB 254 and LB 538, Laws 1973). 16 p.

Descriptors: *Administrative agencies, *Adoption of practices, *Nebraska, *Water quality standards, *Water pollution control, Water pollution, Grants, Disposal, Sewage treatment, Fish, Wildlife, Permits, Public health, Construction, Recreation, Installation, Operation and maintenance, Administrative decisions.

In 1971 Nebraska enacted legislation establishing a new Solid Waste Division and merging the Water Pollution Control Council and the Air Pollution Control Council. This legislation, known as the Environmental Protection Act, also established a control council responsible for setting water quality standards to be applicable to the waters of the state. Other provisions of the Act include: (1) the council shall give due notice and conduct public hearings before establishing, amending, or repealing water quality standards; (2) the Department of Environmental Control shall have the powers to administer provisions of the Act; (3) whenever the council has reason to believe that any provision of the Act has been violated, it may take certain specified steps to correct the alleged violation; and (4) any person denied a permit by the council is entitled to a fair hearing. Provision is also made for immediate action by the secretary in case of emergency, and for the levying of fines and penalties for violations of the act. (Segall-Florida)
W76-04384

LIVESTOCK FEEDLOTS ARE POLLUTION SOURCE,
For primary bibliographic entry see Field 5B.
W76-04413

ANIMAL WASTE MANAGEMENT IN MODERN PRODUCTION SYSTEMS,
New York State Coll. of Agriculture and Life Science. Dept. of Poultry Science.
R. J. Young.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p 53-60, 6 ref.

Descriptors: *Farm wastes, *Oxidation lagoons, *Waste disposal, Research and development, *Waste treatment, Odor, Water pollution, Nutrients, Fertilizers, *Dehydration, *Incineration.
Identifiers: Waste management, Land disposal.

The design of animal production units of the future must take into consideration the conditions necessary for optimum production with a management system that will minimize environmental pollution. The encroachment of resort and residential developments into rural areas increases this necessity. It is essential that the cost of livestock operation include waste handling and disposal costs. In the College of Agriculture at Cornell University, an Interdepartmental Task Force has been developed with representatives from the Department of Agricultural Economics, Agricultural Engineering, Agronomy, Animal Science, Food Science, and Poultry Science to investigate such management problems as waste disposal systems, odor identification and control, water pollution prevention, nutrient removal, reutilization of animal wastes as fertilizers or foodstuffs, and new methods of waste management which can economically become part of the total production system. Studies discussed include: (1) use of an oxidation ditch in a poultry house, (2) incineration of poultry manure, (3) dehydration of poultry manure with heated air, and (4) water pollution from land disposal of manure. (Merryman-East Central)
W76-04414

AN ASSESSMENT OF THE AGRICULTURAL AND PROCESSING WASTE PROBLEMS AND CONTROL IN WEST VIRGINIA,
West Virginia Univ., Morgantown. Agricultural Experiment Station.
A. D. Longhouse.
Presented at Conference on Agricultural and Processing Wastes in the Eastern Region: A Perspective, Philadelphia, Pennsylvania, December 1-3, 1970, p 68-73, 1 tab.

Descriptors: *Farm wastes, *Regulation, *West Virginia, *Agriculture, *Water pollution control, *Air pollution, Soil contamination, Public health.

Pollution of air, water, and soil from agricultural sources is not yet a serious problem in West Virginia, but it is growing. Legislative acts delegating authority for the control of all sources and types of pollutants, including those of agriculture, are vested in several state agencies. The three regulatory agencies of West Virginia which are responsible for enforcing pollution laws are: the State Board of Health, the Department of Natural Resources, and the Air Pollution Control Commission. The State Board of Health supervises and controls the Department of Health and makes and enforces health regulations. This regulation includes dairies, creameries, and slaughterhouses. The Department of Natural Resources administers the Water Pollution Control Act and the Surface Mining Act. The Air Pollution Control Commission administers the Air Pollution Law of West Virginia. In practice, no single regulatory body has sole jurisdiction and responsibility regarding pollution. Each agency's involvement corresponds with its areas of interest. (Merryman-East Central)
W76-04415

POLLUTION-CONTROL TECHNIQUES AND REQUIREMENTS,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Engineering.
A. J. Muehling, and D. L. Day.
In: Vertical Coordination in the Pork Industry: Proceedings, AVI Publishing Company, Inc.,

Westport, Connecticut, 1971, p 127-138. 5 fig, 7 ref.

Descriptors: *Farm wastes, *Regulation, *Illinois, Agricultural runoff, Odor, Permits, *Hogs, Water pollution control, Waste treatment, Water quality standards.
Identifiers: *Pollution control, *Waste handling.

Main objectives are to (1) examine the regulations governing pork producers in Illinois; (2) provide guidelines for producers to use in planning swine installations; and (3) discuss systems for handling swine manure. To carry out the objectives of the 1970 Illinois Environmental Protection Act, three agencies were created: the Pollution Control Board, the Environmental Protection Agency, and the Institute for Environmental Quality. These agencies and their functions are briefly discussed. Possible regulations governing registration, runoff, odor, handling and disposal of swine wastes are examined. Suggested pork producer guidelines are: (1) plan an approved method of swine waste handling; (2) consider odor nuisances in locating the facility; (3) control runoff and manure overflow; (4) be considerate of neighbors; and (5) practice good housekeeping. Simple, complex and combined systems for handling swine manure are examined. They include: (1) solid floors--scrape floors and haul; (2) slotted floors--store and haul; (3) slotted floors--lagooning and hauling; (4) slotted floor--oxidation ditch and lagoon; and (5) flushing gutter--lagoon and irrigation. Future waste management possibilities have the common objective of utilizing wastes, instead of creating a disposal problem. Pollution control regulations should result in a concern for uniformity in the regulations, stronger pork producers' organizations, and cooperation with agencies on regulations governing pork installations. (Penrod-East Central)
W76-04420

GUIDELINES FOR CATTLE FEEDLOT DESIGN,
Montana State Univ., Bozeman. Dept. of Agricultural Engineering.
C. M. Milne.
Special Report AE-102, Presented at 1971 Montana Nutrition Conference, February 8-9, 1971, 18 p, 5 tab.

Descriptors: *Farm wastes, *Feed lots, *Design criteria, *Montana, Locating, Confinement pens, Water pollution control, *Waste treatment, Waste disposal.
Identifiers: Animal health, Unpaved lots, Paved lots, Runoff control, Waste management.

Montana already has the feed and cattle resources on which a feedlot industry can be based. Engineeging guidelines for establishment of feedlots are discussed. The general functional requirement for a feedlot is to produce a pound of beef at the lowest possible cost, subject to a possible quality constraint. The main materials handled in a feedlot are water, animal wastes, feed, and cattle. Feedlot functional requirements and criteria are related to the following factors: (1) Materials handling, (2) Utilization of equipment and labor, (3) Production and efficiency, (4) Animal health, and (5) Water and air pollution control. Design criteria are grouped into two categories: (1) Location and site requirements, and (2) Facilities design. Each category is discussed. The physical requirements of feedlot alternatives are given. Waste management alternatives for various production methods are discussed. Housed feedlots have, in general, eliminated the 'runoff' problem from the feedlot itself. A general procedure is outlined for the development of a major feedlot installation. (Penrod-East Central)
W76-04430

REVIEW OF RESEARCH AND RECOMMENDATIONS ON ANIMAL WASTE MANAGEMENT CONTROL MEASURES FOR MONTANA WITH SPECIAL REFERENCE TO BEEF CATTLE FEEDLOTS,
Montana State Univ., Bozeman. Dept. of Agricultural Engineering.
C. M. Milne.
Special Report AE-101, November 10, 1970, 36 p, 3 tab, 29 ref.

Descriptors: *Montana, *Feed lots, *Cattle, *Regulation, *Farm wastes, Reviews, Water pollution control, Wast treatment, Waste disposal.
Identifiers: *Waste management, *Pollution control.

Definite steps are underway in Montana toward developing a State animal waste control policy. This report provides guidance for the development of a suitable State policy and administrative mechanism for preventing pollution from livestock operations in Montana. Four categories of potential pollution are discussed. Organic pollution, inorganic pollution, bacteriological pollution and esthetic pollution (nuisance). The major factors contributing to feedlot pollution potential are location, hydrology, feedlot concentration and feed supply. Waste management alternatives for both solid and liquid wastes include: biological stabilization, land disposal for crop growth, high rate land disposal, composting, vacuum filtration, trickling filters, etc. Five procedures to deal with feedlot runoff are discussed (1) Uncontrolled release to a stream, (2) controlled release to a stream, (3) evaporation, (4) controlled release to land, and (5) biological treatment. Returning the wastes to the land for crop production is the most economically feasible system for Montana. A list of recommendations for regulations governing feedlots and a possible outline of feedlot design criteria are given. (Penrod-East Central)
W76-04431

TO EXPAND THE INDIANA DUNES NATIONAL LAKESHORE (HR 3571).
For primary bibliographic entry see Field 6E.
W76-04439

STORM KING MOUNTAIN (PUMP STORAGE PLANT).
Hearings--Subcomm on Fisheries, Comm on Merchant Marine and Fisheries, House of Rep, 93 Cong 2d Sess, Feb 19, 20, 1974. 395 p, 1 append.

Descriptors: *New York, Hudson River, Environmental effects, *Environmental effects, *Fish populations, *Fishkill, *Pumping plants, *Public utilities, Electric power, Fish reproduction, Fish conservation, Fishing, Sport fishing, Water pollution, Water pollution sources, Water pollution effects, Water pollution control, Water quality, Water quality control, Thermal pollution, Heated water, Nuclear powerplants, Legal aspects, Legislation, Federal government.
Identifiers: *Storm King Mountain Project(NY).

When construction of the Storm King pump storage plant was first approved in 1971, the Federal Power Commission reported that the project's impact on the environment would be minimal. However, significant new evidence has surfaced which indicates that the project may create adverse environmental effects, the most notable being a drastic reduction in fish populations in the affected area. Presented at these hearings were statements and testimony from various concerned individuals and organizations including environmental, conservation, and fishermen's groups generally opposed to the Storm King project, and Consolidated Edison Co. in favor of the project. Addenda to the hearings include graphs and statistical analyses of the Storm King Project. (Nursey-Florida)
W76-04440

PERMITS OF ACTIVITIES IN NAVIGABLE WATERS OR OCEAN WATERS.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 40, No 144, p 31319-31344, July 25, 1975, 26 p.

Descriptors: *Navigable waters, *Dredging, *Landfills, *Permits, *Regulation, *Administrative decisions, *Waste disposal, Standards, Rivers, Streams, Rivers and Harbors Act, Environmental effects, United States, Water quality control, Administrative agencies, Adoption of practices, Fish, Wildlife, Boats, Wetlands, Oceans, Canals.
Identifiers: *Federal Water Pollution Control Act Amendment of 1972, Marine sanctuaries, Fill permits.

This regulation prescribes the policies to be followed by all Corps of Engineers activities in connection with applications for permits authorizing structures or work affecting navigable waters of the United States. This includes the discharge of dredged or fill material into navigable waters, and the transportation of such material for the purpose of dumping it into ocean waters. The regulation administratively defines both navigable waters and waters of the United States and contains provisions covering many diverse areas that may be affected by permit issuance, including: (1) wetlands; (2) fish and wildlife; (3) structures for small boats; (4) canals; (5) seaplane operation; (6) foreign trade zones; and (7) activities in coastal zones and Marine sanctuaries. Further, matters relating to permit application procedures and to public meeting and hearings are covered. The delegation of authority to issue and deny permits for disposal of dredged materials is outline in the appendices. (Parrish-Florida)
W76-04441

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 143, p 27078-27084, July 24, 1975, 7 p.

Descriptors: *Permits, *Regulation, *Administrative decisions, *Waste disposal, *Adoption of practices, United States, Legislation, Water quality, Administrative agencies, Decision making, Pollutants, Water quality control, Water pollution control, Pollution abatement, Control.
Identifiers: *National Pollution Discharge Elimination System(NPDES), Federal Water Pollution Control Act Amendments of 1972, Effluent limitations.

In 1973, Procedures were established for issuance of National Pollutant Discharge Elimination System (NPDES) permits. This notice amends certain of those procedures. The major changes are: (1) the requirment for public notice of each complete permit application has been changed to require public notice of the proposed issuance or denial of a permit; (2) public hearings are now required where there is significant public interest in the permit; (3) adjudicatory hearings will now be held after a proposed applicant has received his permit; (4) a contested provision of a permit does not become effective until all administrative remedies are exhausted; (5) a permit applicatnt is now in the same position as other interested persons and must make his employees and consultants available for examinations; (6) issues of law must be submitted to the Environmental Protection Agency (EPA) for decision; and (7) appeals from decisions of the Regional Administrator have been expanded to permit appeals of initial decisions. It is hoped these changes will ensure the fair and orderly administration of the issuance of NPDES permits. (Parrish-Florida)
W76-04442

VARIANCE PROCEDURES IN EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 156, p 28926-28927, August 12, 1974, 2 p.

Descriptors: *Administrative agencies, *Effluents, *Water pollution sources, *Industrial wastes, *Federal government, Water pollution control, United States, Water law, Legal aspects, State governments, Regulation, Abatement, Control Water policy, Water pollution, Water resources, Discharge(Water), Liquid wastes, Navigable waters, Standards.
Identifiers: *Effluent limitations, Administrative regulations.

In response to public comment, the Environmental Protection Agency has inserted a variance clause in its regulations defining effluent levels which various industrial categories are required to achieve by July 1, 1977, for their discharges into navigable waters. The clause provides that any discharger of other interested person may submit to the Regional Administrator or the State, if appropriate, evidence of factors fundamentally different from those considered in the establishment of the guidelines. The Regional Administrator or the State shall then make a written finding on the matter. If the factors involved are indeed fundamentally different, the regional Administrator or the State may substitute effluent limitations either more stringent less stringent then those previously established. Such limitations must then be approved by the Administrator of the Environmental Protection Agency, who may alter them again. This notice includes a list of the regulations in which the variance clause presently appears. (Schilling-Florida)
W76-04443

WATER QUALITY AND POLLUTANT SOURCE MONITORING.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 168, p 31499-31505, August 28, 1974, 7 p.

Descriptors: *Data collections, *Monitoring, *Federal Water Pollution Control Act, *Administrative decisions, *Water pollution control, Federal government, State governments, Governmental interrelations, Water law, Legal aspects, Water pollution, Water quality control, Water quality, Administrative agencies, Regulation, Standards, Toxins, Groundwater, Lakes, Navigable waters, Eutrophication, Data processing.
Identifiers: *Administrative regulations, Effluent limitations, Hazardous substances(Pollution).

This notice concerns proposed regulations for monitoring in state and interstate water pollution control programs. Monitoring is required by Titles I, II, III, and IV of the Federal Water Pollution Control Act, which stipulate that no grant shall be made under Section 106 of the Act to any state, beginning in fiscal year 1974, that has not established an appropriate monitoring program. The Director of the water pollution control agency in each state is required to develop and implement a strategy for progressing systematically toward implementation of the requirements set forth in this notice. These requirements include: (1) development of a monitoring strategy; (2) supporting the state continuing planning process; (3) evaluation of water quality standards; (4) toxic pollutant and groundwater monitoring; (5) classification of publicly owned fresh water lakes by eutrophic conditions; and (6) collection, evaluation, and analysis of the basic information needed for the annual inventory reports required by Section 305(b) of the Act. Written comments on the proposed regulations are invited. (Schilling-Florida)
W76-04444

GLASS MANUFACTURING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 163, p 30281-30294, August 21, 1974, 14 p.

Descriptors: *Federal Water Pollution Control Act(FWPCA), *Adoption of practices, *Effluents, *Industrial wastes, *Water pollution control, Water law, Legals aspects, Federal government, Administrative agencies, Water pollution, Costs, Wastes, Water pollution sources, Liquid wastes(Water), Waste water(Pollution), Economic impact, Technology, Abatement, Pollutants, Water quality control, Measurement, Standards, Regulation.
Identifiers: Effluent limitations, Administrative regulations, *Glass manufacturing, Point sources(Pollution), Hazardous substances(Pollution).

Pursuant to provisions of the Federal Water Pollution Control Act, the Environmental Protection Agency has proposed effluent limitations and performance and pretreatment standards for the glass manufacturing point source category. The proposed regulation will amend 40 CFR Part 426 by adding the following subcategories of manufacturing: Glass Containers, Machine Pressed and Blown Glass; Glass Tubing; Television Picture Tube Envelopes; Incandescent Lamp Envelopes; and Hand Pressed and Blown Glass. The regulation for each listed subcategory include effluent limitation guidelines representing the degree of effluent reduction attainable through application of the best practicable control technology that are currently available and economically feasible. In addition, there is a summary of conclusions concerning various topics, such as: (1) waste characteristics; (2) origin of waste water pollutants; (3) treatment and control technology; (4) cost estimates for control of waste water pollutants; (5) energy requirements; and (6) non-water quality environmental impacts. (Schilling-Florida)
W76-04445

NONFERROUS METALS MANUFACTURING POINT SOURCE CATEGORY (EFFLUENT LIMITATIONS AND GUIDELINES).
Environmental Protection Agency, Washington, D.C.
40 Fed Reg 8530-35 (1975). 6 p, 13 tabs.

Descriptors: *Copper alloys, *Federal Water Pollution Control Act, *Waste disposal, *Water pollution control, *Effluents, Environmental effects, Regulation, Legislation, Water quality, Administrative agencies, Adoption of practices, Waste water(Pollution), Federal government, Sewage treatment, Treatment facilities, Environmental control, Treatment.
Identifiers: *Non-ferrous metal, Administrative regulation.

The Environmental Protection Agency has proposed amendments to Chapter 40 of the Code of Federal Regulations concerning established effluent limitation and guidelines for existing sources and standards of performance and pretreatment standards for new sources for the noferrous metals manufacturing point source category. The proposed regulation will incorporate pretreatment standards for existing sources and standards of performance and pretreatment standards for existing sources and standards of performance and pretreatment standards for new sources into its existing subcategories of (1) primary copper melting; (2) primary copper refining; (3) secondary copper; (4) primary lead; and (5) primary zinc. Section 307(b) of the Federal Water Pollution Control Act requires such regulation standards for pollutants introduced into publicly owned treatment works. Federal regulations establish that EPA will propose scuch specific pretreatment standards at the time effluent limitations are established for point source discharges. The pretreatment standards of effluent limitations were based upon the best practicable control technology available as required by federal regulation. (Welch-Florida)
W76-04447

OIL AND HAZARDOUS SUBSTANCE LIABILITY.
Coast Guard, Washington, D.C.
39 Fed Reg 41989-94 (1975), 6 p.

Descriptors: *Oil pollution, *Oil spills, *Waste water(Pollution), *Federal Water Pollution Control Act, *Coast Guard Regulations, Waste water disposal, Pollution taxes(Charges), Legal aspects, Disasters, Water quality control, Water quality standards, Water pollution control, Oil, Water policy, Water pollution sources, Penalties(Legal), Navigable waters, Administration, Regulation, Costs.
Identifiers: Federal Water Pollution Control Act Pollution Fund, *Hazardous substances, Federal Water Pollution Control Act Amendments of 1972, Coastal zone management, Coastal waters, Administrative regulations.

The Coast Guard has proposed revising the regulations under section II of the Federal Water Pollution Control Act to conform with the FWPCA Amendments of 1972. The significant change would relate to the discharge and reporting of hazardous substances into navigable waters. The FWPCA requires that any such discharge be reported but there are no penalties for such discharge or failure to report, nor liability for the cost of removal. The proposal treats hazardous substances in a manner similar to oil; thus, anyone responsible for notification, removal, equipment requirements and discharge penalties with respect to oil would be under the same obligation with respect to hazardous substances. Determination of a hazardous substance would be made by the Environmental Protection Agency. The Coast Guard has also proposed guidelines which owners or operators of vessels or onshore facilities located in 'coastal waters' will follow in the event of a discharge, including procedures to contain and remove discharges and guidelines to establish removal contingency plans with an 'On-Scene Coordinator'. A further amendment proposes clarification of policies, procedures and reporting requirements concerning payments from and deposits into the Pollution Fund authorized under FWPCA. (Welch-Florida)
W76-04452

RUBBER PROCESSING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
40 Fed Reg 18172-73 (1975), 2 p.

Descriptors: *Industrial wastes, *Classification, *Water quality standards, *Effluents, *Waste water disposal, Pollutants, Standards, Waste water(Pollution, Maintenance, Oil, Industries, Air pollution, Emulsions, Federal government, Water quality control.

Proposed herein are amendments to the effluent limitations and guidelines for existing sources and standards of performance and pretreatment standards for new sources for the tire and synthetic segment of the rubber processing point source category. Provisions applicable to discharges of process waste water pollutants resulting from the production of pneumatic tires and inner tubes in tire and inner tube plants are included. The term 'process waste water', in the case of tire and inner tube plants constructed before 1959, is defined. It is further declared that all plants constructed before 1959 shall employ the best practicable maintenance and housekeeping practices in order to

minimize discharge of oil and grease in nonprocess waste waters. There are also minor amendments to the emulsion crumb rubber subcategory, the solution crumb rubber subcategory, and the latex rubber subcategory. (Segall-Florida)
W76-04453

WATER QUALITY STANDARDS.
Environmental Protection Agency, Washington, D.C.
40 Federal Register, p 18170-71 (1975), 2 p.

Descriptors: *Idaho, *Federal Water Pollution Control Act(FWPCA), *Dissolved oxygen, *Dams, *Water quality standards, Standards, Oxygen, Reservoirs, Aeration, Saturation, Fisheries, Trout, Streams, Reach(Streams), Irrigation water, Fish, Salmonids, Construction, Operations, Jurisdiction, Navigable waters.
Identifiers: *Snake River.

The State of Idaho has amended their water quality standards for dissolved oxygen for the segment of the Snake River from American Falls Dam downstream to Lake Walcott from 90 percent of saturation or 6 mg/l, whichever is greater, to 6 mg/l. This amendment was made because a proposed replacement dam project in the area will alter the existing design features so that natural reaeration will not occur. The American Falls Reservoir District has proposed to supplement the low oxygen in released waters by adding oxygen that will be trucked to the project. The new minimum dissolved oxygen content of 6 mg/l will not interfere with or be injurious to any use made of such affected waters. Finally, this amendment will apply only if the proposed dam project is completed and begins operation. (Segall-Florida)
W76-04454

GEORGIA WATER QUALITY CONTROL ACT.
For primary bibliographic entry see Field 6E.
W76-04458

WATER SUPPLY QUALITY CONTROL.
For primary bibliographic entry see Field 6E.
W76-04461

SPRINGFIELD MARINE BANK V. POLLUTION CONTROL BOARD (APPEAL FROM DENIAL OF VARIANCE FROM BAN ON FURTHER CONNECTION OF SANITARY DRAINAGE OUTLETS TO SEWER).
For primary bibliographic entry see Field 6E.
W76-04464

SPRINGFIELD MARINE BANK V. POLLUTION CONTROL BOARD (APPEAL FROM DENIAL OF VARIANCE FROM BAN ON FURTHER CONNECTIONS OF SEWER OUTLETS TO SEWER).
For primary bibliographic entry see Field 6E.
W76-04465

WATKINS V. COBB COUNTY COMMISSION (DAMAGE CAUSED BY SEWER OVERFLOW INTO CONDOMINIUM).
For primary bibliographic entry see Field 6E.
W76-04470

STATE V CONSOLIDATED COAL CO (STATUTORY PROHIBITION AGAINST DEPOSITION OF SEDIMENT IN PUBLIC WATERS BY STRIP-MINING HELD DENIAL OF DUE PROCESS).
For primary bibliographic entry see Field 6E.
W76-04471

CONSERVATION COUNCIL V COSTANZO (DEVELOPER'S FILLING ACTIVITY OF WETLANDS A VIOLATION OF FEDERAL WATER POLLUTION CONTROL ACT).
For primary bibliographic entry see Field 6E.
W76-04473

METROPOLITAN SANITARY DISTRICT V. UNITED STATES STEEL CORPORATION (ABATEMENT OF WATER POLLUTION OF LAKE MICHIGAN).
For primary bibliographic entry see Field 6E.
W76-04500

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

DERIVATION AND EVALUATION OF RESERVOIR RULE CURVES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W76-04014

CALIBRATION OF THE STATE WATER PLANNING MODEL FOR SUB-BASIN 42-KJ OF THE YELLOWSTONE RIVER BASIN,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4A.
W76-04232

6B. Evaluation Process

DEVELOPMENT PRIORITIES IN THE WEST RIVER REGION, NORTH DAKOTA, A SOCIAL ATTITUDE AND COMMUNICATION ANALYSIS,
North Dakota Univ., Grand Forks. Communication Research Center.
J. E. Bowes, and K. R. Stamm.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 504, $6.75 in paper copy, $2.25 in microfiche. Research Report, October 1974. 146 p, 44 fig, 26 tab, append. OWRT A-041-NDAK(1). 14-31-0001-5034.

Descriptors: *Social aspects, Water resources development, Planning, Surveys, *Area redevelopment, *North Dakota, *Attitude, *Communication, Social values, Social change, Rural sociology, *Priorities.
Identifiers: West River Diversion region(N Dak).

Social attitudes and degree of communication concerning development priorities in West River Region of North Dakota were analyzed using written surveys. There was limited awareness of the West River Diversion Project. Among those aware problems identified included aspects of coal development, water management, pollution and agriculture. Federal agencies were more frequently criticized than state agencies as being unresponsive to local needs, but there was good correlation between problems identified by agencies and the general public. Information from agencies tended to diffuse indirectly and there was minimal communication among citizens with similar concerns. A series of suggestions are made to change the situation.
W76-04007

DERIVATION AND EVALUATION OF RESERVOIR RULE CURVES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W76-04014

COMMUNITY VALUES AND COLLECTIVE ACTION IN RESERVOIR DEVELOPMENT,
Iowa State Univ., Ames. Dept. of Sociology and Anthropology.
G. L. Bultena.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 499, $7.50 in paper copy, $2.25 in microfiche. Completion Report, No 69, Iowa State Water Resources Research Institute, September, 1975. 184 p, 19 ref, 4 append. OWRT B-020-IA(2). 14-31-0001-3587.

Descriptors: *Attitudes, *Reservoirs, *Social impact, *Social values, Decision making, Political aspects, Psychological aspects, Project benefits, Recreation demand, *Iowa, Pre-impoundment, Community development, Water quality, Social participation.
Identifiers: Ames Reservoir(Ia), Des Moines(Ia), Jeffereson Reservoir(Ia), Ledges State Park(Ia), Saylorville Reservoir(Ia).

Reactions of Iowans (N=1,000) to three large reservoir projects were surveyed. Information was obtained about their knowledge of the projects, their assessments of project desirability, their evaluations of likely personal benefits and costs of reservoirs, and personal actions they had taken to influence government decision making on the reservoirs. Major findings were: (1) a generally low level of public acquaintance with the proposed projects, (2) a preponderance of public opposition to two of the projects, (3) relatively low levels of public concern about water quality and flooding problems that the reservoirs were designed to alleviate, (4) substantial recreational use being made of the undeveloped reservoir sits, and (5) considerable skepticism about citizen's abilities to influence government decision making on these projects. Factors have hypothesized importance to the several attitudinal and knowledge variables were tested. Examination also was made of the nature and dynamics of agency-public confrontations over the reservoir projects.
W76-04015

REPORT FOR THE FISCAL YEAR 1972 - 1973: STUDY OF THE ST. LAWRENCE RIVER.
St. Lawrence River Working Group, Quebec.
For primary bibliographic entry see Field 4A.
W76-04166

MONOGRAPH ON COMPREHENSIVE RIVER BASIN PLANNING.
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 4A.
W76-04175

INDICATORS OF CHANGE IN THE RECREATION ENVIRONMENT: LAW AND ENVIRONMENTAL PLANNING,
Department of Justice, Washington, D.C. Land and Natural Resources Div.
For primary bibliographic entry see Field 6G.
W76-04328

INLAND WETLANDS: TECHNICAL DEFINITIONS DIRECTED TOWARD EMERGING POLICY ALTERNATIVES,
Connecticut Univ., Storrs. Inst. of Water Resources.
T. B. Helfgott, and M. W. Lefor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 815, $3.50 in paper copy, $2.25 in microfiche. Research Project Technical Completion Report, December 31, 1975. 16 p, 3 ref, append. OWRT B-010-CONN(2). 14-31-0001-5062.

Descriptors: *Wetlands, Freshwater, *Land use, *Legal aspects, *Administrative decisions, *Political aspects, Public health, Aquatic habitats, Aquatic plants, *Connecticut, Algae, Water policy, Alternative planning.

Identifiers: Functional role of wetlands, Definition of wetlands, Delineation of wetlands, Wetlands metabolism, Wetlands commissions.

A multifaceted, interdisciplinary definition of inland wetlands was formulated through a series of conferences, seminars and research directed toward an understanding and conservation of inland wetlands. Data from the following subject areas were considered in the formulation of the definition: botany, with habitat and vascular plant association and algal species lists compiled; limnology, with emphasis placed on the chemical interplay between wetlands and lakes; political sciences, with a profile report on Connecticut Wetland Commissions included; natural resources; soil engineering; and public health aspects. The 'idealized' definition is now being legally reviewed with two endpoints in mind: (1) the formulation of an ideal, comprehensive legal definition to suggest to other states and regions, and (2) the formulation of an amendment to the present Connecticut wetland laws in order to more effectively conserve wetlands in Connecticut. (de Lara-Connecticut)
W76-04389

A MULTIDISCIPLINARY APPROACH TO SOLVING COMMUNITY WATER PROBLEMS,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 10D.
W76-04391

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE ECONOMICS OF SEWERAGE PRICING AND INVESTMENT POLICIES: THE MADISON METROPOLITAN SEWERAGE DISTRICT,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W76-04008

MONOGRAPH ON COMPREHENSIVE RIVER BASIN PLANNING.
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 4A.
W76-04175

6D. Water Demand

THE ECONOMICS OF SEWERAGE PRICING AND INVESTMENT POLICIES: THE MADISON METROPOLITAN SEWERAGE DISTRICT,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5G.
W76-04008

STATISTICAL ESTIMATION OF A DEMAND FUNCTION FOR RESIDENTIAL WATER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
H. M. Kitchen.
Social Science Series No 11, 1975. 9 p, 3 tab.

Descriptors: *Water supply, *Water demand, *Statistics, Marginal costs, Pricing, Control, *Estimating, Costs, Decision making, Unit costs, Instrumentation, Model studies, Regional analysis, Regression analysis, Use rates, Water rates, *Domestic water.
Identifiers: *Residential water, Consumers, Consumption impact, Regional variations, Dwelling units.

The objective is to define and statistically test factors that are felt, on an a priori basis, to affect significantly the residential demand for water. Using 'ordinary least squares' regression, cross-sectional models are constructed on the basis of 1971 data for 57 urban centres with populations over 10,000. Essentially the influence of climatic factors, population, household size, income and price are tested. Whereas consumers under a flat-rate system are faced with a marginal price of zero, consumers in metered consumption areas face a positive marginal price. As a result, separate models are tested for centres imposing flat-rate charges and for metered centres. To test the impact of metering per se, a compositive model in which all centres are included is constructed. Consumers in flat-rate areas do not have an economic incentive to regulate water use, and as a result, their consumption patterns exhibit wide random variance. The model for metered centres is capable of explaining more of the variation in interurban area consumption, although the commodity price variable itself does not show the relationship to consumption that is hypothesized. It is concluded that the model is not suitable for determining the effects of unit price charges; the extreme significance of the metering dummy variable, however, does suggest that water consumption is subject to some economic consideration. Then, there are obvious policy implications. A negative relationship between consumption and average rainfall for 1971 suggests that consumers are responsive to water conservation efforts during seasonal peak periods. (Environmental Canada)
W76-04236

LEGAL PROBLEMS INVOLVED IN DEVELOPING WATER SUPPLIES FOR ENERGY DEVELOPMENT,
Debevoise and Liberman, Washington, D.C.
For primary bibliographic entry see Field 3E.
W76-04336

WATER DEMANDS FOR ENERGY DEVELOPMENT,
New Mexico Univ., Albuquerque. Dept. of Economics.
A. V. Kneese, and F. L. Brown.
Natural Resources Lawyer, Vol 8, No 2, p 309-33 (1975). 25 p, 5 tab, 8 fig.

Descriptors: *Colorado River Basin, *Missouri River, *Water demand, *Energy, *Water resources, Energy conversion, Electric power, Cooling, Evaporation, Mining, Runoff, Discharge(Water), Air pollution, Fossil fuels, Groundwater, Irrigation, Interbasin transfers, Agriculture, Streamflow, Synthetic hydrology, Navigation, Water quality, Recharge, Aquifers.
Identifiers: *Absolute water scarcity.

The continued use of water in energy development presents important questions concerning the impact on water supplies and aquatic ecological systems. Te consumptive use of water for energy extraction and conversion processes reduces the amount of water available for other uses and may lead to 'absolute scarcity', a situation in which there is a lesser physical amount of water available than would otherwise be consumed. Absolute water scarcity is not a problem for the nation as a whole, but it does present problems in some arid regions, especially the Upper Missouri and Upper Colorado River Basins. The Colorado is a highly developed, already overworked river which now faces the prospect of a crushing absolute scarcity of water. In comparison, the Yellowstone-Upper Missouri is a relatively primitive situation where the water energy issues are primarily environmental, qualitative rather than quantitative. Other factors discussed that affect the amount of water used in energy development include: (1) scale of development; (2) location of processing facilities; (3) energy development options; (4) specific technology designs for particular options; (5) degree of reclamation of mined land achievable; and (6) public policy. (Segall-Florida)
W76-04337

MODELS FOR MUNICIPAL AND INDUSTRIAL WATER DEMAND FORECASTING IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. T. Lauria, and C. H. Chiang.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 800, $5.00 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rpt. No. 110, Nov 1975. 71 p, 3 fig, 23 tab, 27 ref. OWRT B-060-NC(1). 14-31-0001-3920.

Descriptors: *Forecasting, *Water requirements, *Water demand, *Municipal water, *Industrial water, Population, Average income, Rainfall, *Mathematical models, Industrial use, Model studies, *North Carolina, Cities.

A mathematical model for forecasting the water requirements of North Carolina municipalities has been developed and verified; it explicitly excludes industrial water usage. The model was developed from a sample of about 90 municipalities located in Northern and Southern Piedmont sections of the State. Baseline data were obtained for the period 1970-72. The model includes three predictor variables: population, average annual per capita income, and annual rainfall. The R2 value obtained in regression analysis for the multiplicative model is 0.88, and the overall F statistic for significance of regression is about 200 with 3 and 85 degrees of freedom. Several additional models were tested and rejected before the final one emerged; some of these included such variables as water price and the number of commercial workers in town. The final model was verified by predicting water usage in 20 municipalities in the western part of the State for which actual usage data are available. A separate model has been developed and calibrated for predicting industrial water requirements in N.C. Extensive data for verification are simply not available, but verification with existing information, although limited, is excellent. This model makes use of the State's input-output model developed by Research Triangle Institute in 1971. It includes 58 industrial sectors in each of three regions within the State plus the Rest-of-World. The principal contribution of this study includes a set of industrial water usage coefficients which are developed from published sources of data. (Stewart-North Carolina State)
W76-04390

6E. Water Law and Institutions

COMMUNITY VALUES AND COLLECTIVE ACTION IN RESERVOIR DEVELOPMENT,
Iowa State Univ., Ames. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W76-04015

CANADA WATER ACT, ANNUAL REPORT - 1974 - 1975.
Department of the Environment, Ottawa (Ontario).
English and French, 1975. 29 p, 1 tab.

Descriptors: *Governments, *Water management(Applied), *Planning, *Water law, Water resources development, Research and development, Government supports, Governmental interrelations, Project planning, Nutrients, Data collections, Data storage and retrieval, Water resources, Water quality, *Canada.
Identifiers: *Canada Water Act.

This annual report, covering operations to March 31, 1975, first sketches the main provisions of the Canada Water Act, and then briefly discusses some of the more important programs which have been or are expected to be undertaken to meet those provisions. Details of implementation agree-

ments, planning studies, and other cooperative arrangements entered into are given along with information on the program to regulate nutrient releases and on other programs to improve the federal water management capability. (Environment Canada)
W76-04152

MIZUSHIMA OIL SOILL,
Environmental Protection Service, Ottawa (Ontario). Environmental Emergency Branch.
For primary bibliographic entry see Field 5G.
W76-04159

MACKENZIE BASIN INTERGOVERNMENTAL LIAISON COMMITTEE - FIRST REPORT (TO DECEMBER 31, 1974).
Mackenzie Basin Intergovernmental Liaison Committee, Ottawa (Ontario).
Information Canada, Ottawa, 1975. 35 p, 2 maps.

Descriptors: *Governments, *Water policy, Water resources, Water management(Applied), *Governmental interrelations, *Canada, River basin development.
Identifiers: Provincial government activities, Federal government activities, Joint programs, Mackenzie Valley Pipeline, Athabasca River, Peace River, British Columbia, Alberta, Saskatchewan, Northwest Territories, Yukon Territory.

This is the first annual report of the Mackenzie Basin International Liaison Committee prepared to inform the various governments and general public on the deliberations of the committee. Information concerning provincial activities in the basin (Alberta, Saskatchewan, British Columbia), Government of Canada activities, as well as joint federal-provincial projects is included. (Environment Canada)
W76-04176

RESEARCH PROGRAM - HYDROLOGY RESEARCH DIVISION - SUMMARIES OF PROGRESS AND SHORT RESEARCH REPORTS.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2A.
W76-04239

FISH PROCESSING OPERATIONS LIQUID EFFLUENT GUIDELINES.
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5G.
W76-04240

WATER POLLUTION CONTROL DIRECTORATE PUBLICATIONS.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W76-04253

CANADA CENTRE FOR INLAND WATERS, 1974.
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W76-04258

INDICATORS OF CHANGE IN THE RECREATION ENVIRONMENT: LAW AND ENVIRONMENTAL PLANNING,
Department of Justice, Washington, D.C. Land and Natural Resources Div.
For primary bibliographic entry see Field 6G.
W76-04328

THE PROTECTION OF THE ENVIRONMENT AND WORLD PUBLIC ORDER: SOME RECENT DEVELOPMENTS,
Yale Univ., New Haven, Conn. School of Law.
For primary bibliographic entry see Field 6G.
W76-04329

SYSTEMS DESCRIPTION OF THE U.S. COAST GUARD MARITIME ENVIRONMENTAL PROTECTION PROGRAM,
For primary bibliographic entry see Field 5G.
W76-04330

A SURVEY OF REMEDIES (TO WATER POLLUTION AND WATER SCARCITY PROBLEMS).
Stanford Environmental Law Society, Calif.
For primary bibliographic entry see Field 5G.
W76-04331

COMPENSATION FOR OIL POLLUTION DAMAGE RESULTING FROM EXPLORATION AND EXPLOITATION OF HYDROCARBONS IN THE SEABED,
Compagnie Francaise des Petroles, Paris (France). Dept. of Law.
B. A. Dubais.
Journal of Maritime Law and Commerce, Vol 6, No 4, p 549-73 (1975). 24 p.

Descriptors: *Oil spills, *Cost allocation, *Damages, *Pollution abatement, *International waters, Energy, Ecology, Navigation, Drilling, Negligence, Natural resources, Ships, Pipelines, Marine animals, Marine fish, Oil, Environmental effects, Costs, International law.

Increasing demands for petroleum products have produced a dramatic increase in offshore exploration and drilling. This increase has brought with it an increase in the risk of pollution. Pollution damage includes two elements--direct damage caused by contamination resulting from the discharge of oil and the cost of preventive and clean-up measures. The problem of damages is discussed under both the civil and common law, along with various measures taken by governments and the oil companies to combat oil pollution. The basis of responsibility for both direct damage and preventive measures is then explored under the laws of various civil and common law countries. The conclusion drawn is that the real issue is to determine not who must be held responsible, but rather who can pay and how much. Also discussed are plans created by the oil industry to provide coverage for the risk of pollution, and the prospects for an international legal regime. (Segall-Florida)
W76-04333

GROUND WATER LAW: PROBLEM AREAS,
Arizona Univ., Tucson. Coll of Law.
For primary bibliographic entry see Field 4B.
W76-04334

PROBLEMS UNDER STATE WATER LAWS: INITIATION OF NEW RIGHTS,
R. L. Dewsnup.
Natural Resources Lawyer, Vol 8, No 2, p 347-58 (1975). 12 p, 1 chart.

Descriptors: *Water rights, *Beneficial use, *Water resources development, *Water management(Applied), *Utah, Streams, Appropriation, Diversion, Montana, Water conservation, Planning, Water quality, Flood control, Cloud seeding, Groundwater, Wildlife, Fish, Hydrologic data.
Identifiers: *Hydrologic units.

Several years ago, the accepted notion of appropriation law was that fish and wildlife values, aesthetic considerations, and many instream uses were not 'beneficial uses' and thus could not serve to prevent traditional appropriations and diversions, even where stream depletion would otherwise result. This view is changing in many appropriation states. For example, Utah is conducting an experiment with a prototype program for water resource conservation and development. Under the program, a Unit Advisory Council would develop a draft plan to be reviewed by three separate state level entities before being sent to the state Board of Water Resources. The Board would then hold public hearings on and make amendments to the plan, and a prototype program for two selected hydrologic units would be conducted. If the experiment succeeds, any prospective appropriator could examine the unit plan for the hydrologic unit in which he desired to acquire a water right and immediately determine whether his proposed use was compatible with the plan. An illustrative diagram of institutional arrangements for development and implementation of the state water plan is included. (Segall-Florida)
W76-04335

LEGAL PROBLEMS INVOLVED IN DEVELOPING WATER SUPPLIES FOR ENERGY DEVELOPMENT,
Debevoise and Liberman, Washington, D.C.
For primary bibliographic entry see Field 3E.
W76-04336

WATER DEMANDS FOR ENERGY DEVELOPMENT,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W76-04337

THE FEDERAL RULE OF ACCRETION AND CALIFORNIA COASTAL PROTECTION,
M. C. Whitney.
Southern California Law Review, Vol 48, p 1457-76 (1975). 20 p.

Descriptors: *Federal-state water rights conflicts, *Accretion(Legal aspects), *California, *Coasts, Transportation, Recreation, Management, Jurisdiction, Navigation, Natural resources, Piers, Groins(Structures), Beaches, Construction, Easements, Coastal structures.
Identifiers: Coastlines, *Tidelands, Uplands, Tideland trust.

Disputes concerning tidelands uses are resolved by the judiciary under the tidelands trust concept. California's rule of accretion classifies accretions as tidelands and thus subjects them to the tidelands trust. The federal rule of accretion, however, classifies accretions as uplands and gives any accretion to the owner of the land, thereby failing to implement public interests in the coastline. The California rule provides private landowners with less protection than does the federal rule because it implements the landowner's interests only when those interests are consistent with the public interest. Furthermore, the California rule furthers those public interests in the coastline which the federal rule completely ignores. After the 1967 U.S. Supreme Court case of Hughes v. Washington, the federal rule of accretion applies in California to land which has been the subject of a federal patent, and the California rule applies to all other land. Since most of California's coastal upland was not federally patented, the California rule continues to be generally applicable to the California coastline. In addition, it appears that any assertion of federal jurisdiction over property rights in the coastal zone is inappropriate. (Segall-Florida)
W76-04338

WATER POLLUTION CONTROL IN ALASKA: THE ALASKA ENVIRONMENTAL CONSERVATION ACT OF 1971,
Tennessee Univ. at Nashville.

For primary bibliographic entry see Field 5G.
W76-04340

CRIMINAL JURISDICTION OVER ARCTIC ICE ISLANDS: UNITED STATES V. ESCAMILLA,
L. W. Aubry, Jr.
UCLA-Alaska Law Review, Vol 4, No 2, p 419-440 (1975). 22 p, 90 ref.

Descriptors: *Constitutional law, *Federal jurisdiction, *Arctic Ocean, *Icebergs, *Law enforcement, Islands, Sea ice, International law, Penalties(Legal), Judicial decisions, Public law, Common law, Regulation, Water law, Oceans, United States, Legal aspects.
Identifiers: *Criminal law, *High seas, *Congressional powers.

An American citizen was charged with a murder that occurred on a block of ice floating on the Arctic Ocean. Because the defendant was found innocent, the court never definitely decided the key issue of whether or not the United States had jurisdiction to try the case. According to the author, Congress appears to have the Constitutional power to extend American laws extraterritorially wherever American citizens are involved. If Congress does indeed have such power, it stems from one or more of four possible sources: (1) the high seas clause of the Constitution; (2) a reasonable extension of one of the enumerated powers of Congress; (3) one of Congress' enumerated powers coupled with the 'necessary and proper' clause; or (4) the nationality theory, under which a nation's laws extend to all of its nationals no matter where they are located. These sources are explored to determine if any of them is sufficient to support United States jurisdiction over Arctic ice blocks. The author concludes that, while Congress has the power to regulate the conduct of American citizens on the soil of other nations, this in personam power has not been extended to ice islands. Consequently, the strongest basis for jurisdiction appears to be the high seas clause. (Hoffman-Florida)
W76-04341

AWWA PRINCIPLES OF WATER RESOURCES POLICY (POLICY STATEMENT OF AMERICAN WATER WORKS ASSOCIATION).
American Water Works Association, Denver, Colo.
For primary bibliographic entry see Field 5G.
W76-04342

THE FISHERMEN'S PROTECTIVE ACT: A CASE STUDY IN CONTEMPORARY LEGAL STRATEGY OF THE UNITED STATES,
T. Meron.
American Journal of International Law, Vol 69, No 2, p 290-309 (1975). 20 p, 79 ref.

Descriptors: *Fish harvest, *Boundary disputes, *Commercial fishing, *Foreign waters, *International waters, Legislation, Jurisdiction, Penalties(Legal), Government finance, Economic justification, Intergovernmental relations, Ships, Governmental interrelations, Governments, Foreign countries, Legal aspects, Water law, Political aspects.
Identifiers: *Fishermen's Protective Act, Territorial seas.

The 1954 Fishermen's Protective Act, designed to protect the rights of vessels of the United States on the high seas and in territorial waters of foreign countries provided for reimbursement when vessels of the U.S. are illegally seized by foreign countires claiming an extended territorial sea jurisdiction not recognized by the United States. In practice, the relief given to fishermen under the Act was often limited, since the Act only reimbursed the fishermen for fines, and not for the expensive fishing licenses and other special fees they were often charged. In an effort to eliminate such problems, the Act underwent revisions in 1968 and 1972 to provide for an insurance program whereby fishermen could protect themselves against such losses. The amendments also provided for certain economic sanctions against the seizing foreign country. However, the amendments have had mixed success. While they have encourage the continuation of American fishing operations in disputed areas, they have not discouraged foreign countries from seizing U.S. vessels. (Hoffman-Florida)
W76-04343

SEABED AND SUBSOIL - FEDERAL V STATE CONTROL IN U.S. (DISCUSSION OF UNITED STATES V MAINE).
American Journal of International Law, Vol 69, No 2, p 432-435, (1975). 4 p, 9 ref.

Descriptors: *Ownership of beds, *Subsoil, *Federal-State water rights conflicts, *Submerged Lands Act, *Judicial decisions, Military aspects, Foreign trade, Continental shelf, Oceans natural resources, Federal jurisdiction, State jurisdiction, Political aspects, Legal aspects, Boundary disputes, Boundaries(Property), Resouces development, Coasts.
Identifiers: *Territorial sea.

A special master's report recommended a decree be entered that the United States is entitled, as against the defendant States, to that portion of the seabed and subsoil and the natural resources thereof, underlying the Atlantic Ocean and lying more than three geographical miles seaward from the coast line. The special master relied on an earlier Supreme Court case that held the national interest in defense, international relations, and foreign commerce gave the Federal Government, paramount rights over the territorial sea, together with dominion over the seabed and subsoil. In the same case there was found no historical basis giving the States control over the seabed and subsoil. The States contended that the doctrine of that case was repudiated by Congress when it passed the Submerged Lands Act granting the States dominion over the resources of the seabed within the three-mile limit. The special master rejected this contention, however, finding that by relinquishing to the coastal states rights in such lands within the three-mile limit, the United States confirmed its own rights in submerged lands beyond those limits. (Hoffman-Florida)
W76-04344

THE CALIFORNIA COASTAL ZONE CONSERVATION ACT OF 1972 (PROPOSITION 20) AND COMPARABLE LAND USE LIMITATIONS AFFECTING THE MINERAL INDUSTRY IN OTHER STATES,
Chaplin Petroleum Co., Forth Worth, Tex.
C. A. Zubieta.
Rocky Mountain Mineral Law Institute Annual, Vol. 20, p 283-299 (1975). 17 p, 30 ref.

Descriptors: *California, Wyoming, Montana, Vermont, *Legislation, *Permits, Regulation, Land use, *Land management, *Local governments, *State governments, Legal aspects, Water, Water law, Environmental effects, Environmental control, Land development, Landfills.
Identifiers: California Coastal Zone Conservation Act of 1972(Proposition 20), State policy, Coastal zone management, Fill permits.

In 1972, California voters approved the California Coastal Zone Conservation Act of 1972 (Proposition 20). The Act empowers the State Coastal Zone Conservation Commission and six regional bodies to administer the program of coastal zone protection. Any person wishing to develop a designated area must obtain a permit conditioned upon approval of a majority of the members of a regional commission. No bond is required for a private suit to enforce provisions of the Act. Section 27404 states that persons who began developments prior to passage of the Act shall have vested rights and be exempt from the permit requirement. The Attorney General has issued two opinions which support the position that the continued operation of an oil field does not require a permit. Legislation in Wyoming and Montana promises to be more far-reaching than the California Act. Regulation of energy-producing sites is the object of siting acts. Vermont requires approval of any public or private unit covering more than ten acres or containing more than ten units. Citizens of Denver and Santa Barbara defeated water projects to support population growth. (Jenkins-Florida)
W76-04345

PRIVATE INFLUENCE ON ENVIRONMENTAL POLICY: THE CASE OF THE NATIONAL INDUSTRIAL POLLUTION CONTROL COUNCIL,
State Univ. of New York Coll. at Cortland. Dept. of Political Science.
For primary bibliographic entry see Field 6G.
W76-04346

CASE STUDY OF A HYDROELECTRIC DAM: THE DICKEY-LINCOLN SCHOOL PROJECT,
Massachusetts Inst. of Tech., Cambridge. Civil Engineering Program.
For primary bibliographic entry see Field 6G.
W76-04347

THE MISSISSIPPI PUBLIC TRUST DOCTRINE: PUBLIC AND PRIVATE RIGHTS IN THE COASTAL ZONE,
J. J. Johnson, and C. F. Johnson, III.
Mississippi Law Journal, Vol 41, No 1, p 84-117 (1975). 34 p, 163 ref.

Descriptors: *Wetlands, *Mississippi, *Ownership of beds, *Public rights, *Water rights, Legal aspects, Legislation, Judicial decisions, Accretion(Legal aspects), Boundaries(Property), Boundary disputes, Common law, Eminent domain, Penalties(Legal), Riparian land, Riparian waters, Water law, State governments, Water utilization, Law enforcement, Recreation, Fishing, Navigable waters.
Identifiers: *Public trust doctrine, Coastal waters, Coastal zone management, Contiguous zone, Standing(Legal), Water rights(Non-riparians), Coastal Zone Management Act of 1972.

This article discusses the approach taken by the Mississippi legislature and courts concerning the public trust doctrine. This doctrine states that land below ordinary high water marks belongs to the state as trustee for the public, and recognizes the importance of public access to waterways for fishing, navigation, and recreational purposes. It further accords the State standing in the courts to enforce the public's rights so held in trust. In some cases, individual taxpayers may also be given standing to enforce the public trust, regardless of whether or not unique and personal damages can be shown. Furthermore, Mississippi courts have held that the State cannot convey waterways held in trust to private individuals. It is the authors' view that the State should have the power to convey coastal wetlands as long as the conveyance serves the public interest. (Nursey-Florida)
W76-04348

ICELAND'S REGULATIONS ESTABLISHING A FISHERY ZONE WITH A 50-MILE LIMIT ARE NOT OPPOSABLE TO THE UNITED KINGDOM AND THE FEDERAL REPUBLIC OF GERMANY,
D. J. Foucheaux, Jr.
Texas International Law Journal, Vol. 10, No. 1, p 150-71 (1974). 22 p, 130 ref.

Descriptors: *Commercial fishing, *Law of the sea, *Fisheries, *International law, Boundary disputes, Coasts, Jurisdiction, Judicial decisions,

Adjudication procedure, Oceans, Treaties, Legal aspects, Political aspects, Water law, International water, Fish, Wildlife conservation, Foreign countries.
Identifiers: *International agreements, *Onternational Court of Justice, Jurisprudence, Coastal waters, Territorial waters.

The United Kingdom and West Germany instituted separate proceedings against the Republic of Iceland in the International Court of Justice. Iceland's proposed extension of her coastal fisheries jurisdiction to a fifty-mile limit sparked the disputes. The Court held that Iceland was not entitled to exclude unilaterally British and German fishing vessels from areas between the twelve-mile and fifty mile limits. Further, the Court held that the parties were obligated to undertake good faith negotiations to solve their differences with respect to fishing rights. This article analyzes the Court's rulings in terms of their potential impact on the development of international law. The Court, by framing its opinions in terms of opposability, effectively circumvented the basic issued, that of the validity, under international law, of Iceland's proposed regulations. However, the author suggests that the decisions in these cases are significant with respect to the Court's jurisprudence. By taking a broad view of its jurisdiction, and of the dispute itself, the Court assumed an expanded role in promoting and guiding settlement of the dispute in its broader, political context. (Schilling-Florida)
W76-04349

INTERNATIONAL LAW AND NUCLEAR TEST EXPLOSIONS ON THE HIGH SEAS,
New York Univ., N.Y. Center for International Studies.
S. A. Tiewul.
Cornell International Law Journal, Vol. 8, No. 1, p 45-70 (1974). 26 p, 89 ref.

Descriptors: *Nuclear explosions, *Law of the sea, *Penalties(Legal), Fallout, Radiation, Water law, Legal aspects, Oceans, Natural resources, Treaties, International law, Regulation, Judicial decisions, Water pollution, Air pollution, Government, International waters, Ecology, Environment, Adjudication procedures.
Identifiers: *Standing(Legal), International agreements, Absolute liability, Navigation obstructions, Jurisprudence, Hazardous substances(Pollution).

This article concerns the legality of nuclear test explosions on the high seas, and the amount of international liability which attaches to a state engaged in such experimentation. The author supports his conclusion that nuclear tests on the high seas are illegal with three related areas of international law. First, nuclear testing violates legal doctrines relating to freedom of the high seas insofar as it infringes upon navigation and fishing rights. Second, the ecological effects of nuclear testing violate conventional anti-pollution law. Moreover, nuclear testing is expressly forbidden by the widely-ratified Nuclear Test Ban Treaty. A more complex question concerns the juridical consequences of illegal nuclear activity. It is well established that states are liable for conducting illegal nuclear tests. However, where the injury involves some shared international community interest, liability devolvrs into complex considerations of the law of standing. Recent developments indicate a relaxation of the traditional view, which requires a nation to present proof of direct injury. (Schilling-Florida)
W76-04350

POTENTIAL HEALTH HAZARDS AND THE BURDEN OF PROOF IN ENVIRONMENTAL ACTIONS: THE IMPLICATIONS OF RESERVE MINING.
Iowa Law Review, Vol. 60, No. 2, p 299-314 (1974). 15 p, 192 ref.

Descriptors: *Public health, *Common law, *Water pollution, *Penalties(Legal), *Waste disposal, Legal aspects, Legislation, Federal government, State governments, Judicial decisions, Adjudication procedure, Pollution abatement, Wastes, Environmental effects, Federal Water Pollution Control Act, Water pollution control, Water pollution sources, Water quality control, Water quality standards, Law enforcement.
Identifiers: Nuisance(Legal aspects), Injunctions(Prohibitory), Presumptions(Legal), Congressional hearings, Hazardous substances(Pollution).

This article considers the 'rules of proof' applicable in interstate pollution suits, particularly when the plaintiffs allege an actual or threatened hazard to the public health. The author discusses this issue of burden of proof by exploring the law of nuisance and injunction, the concept of a federal common law, and the treatment of health hazards in non-environmental contexts. The author suggests that, in the absence of specific statutory provisions, the federal common law of public nuisance should be used in determining the requisite burden of proof in interstate pollution suits. After the existence of a public nuisance is established, the focus turns to the question of the proper remedy. The 'balancing of hardships' test is commonly used in determining whether an injunction rather than monetary damages should be granted. The author suggests, however, that since this test generally concerns economic loss or gain to the parties, it is not appropriate when dealing with public health hazards. Courts should grant injunctions more readily when a potential loss of human life exists. (Nursey-Florida)
W76-04351

NATIONAL SAFE DRINKING WATER STRATEGY -- ONE STEP AT A TIME.
Environmental Protection Agency, Washington, D.C. Office of Water Supply.
For primary bibliographic entry see Field 5F.
W76-04354

THE USE AND LEGAL SIGNIFICANCE OF THE MEAN HIGH WATER LINE IN COASTAL BOUNDARY MAPPING,
Spessard L. Holland Law Center, Gainesville, Fla.
F. E. Maloney, and R. C. Ausness.
North Carolina Law Review, Vol. 53, No 2, p 185-273, (December, 1974). 89 p, 605 ref, 1 append.

Descriptors: *High water mark, *Riparian rights, *Boundaries(Property), *Tides, Submerged Lands Act, Tidal waters, Tidal effects, Berms, Littoral, Measurement, Public access, Accretion(Legal aspects), Navigable waters, Avulsion, Marshes, Suveys, Low water mark, Boundary disputes, Bank erosion, Ownership of beds, Shores, Riparian land, Judicial decisions, State governments, Beds under water.
Identifiers: *National Ocean Survey, *Coastal boundaries, Boundary determination, Public trust doctrine, National Environmental Protection Act, Reliction, Ebb-and-flow, Corps of Engineers, Coastal Zone Management Act, Florida Coastal Mapping Act, Artificial accretion, Tidal benchmarks, Tidal datum, Hummocks.

Prerequisite to the development of any regulatory program for coastal waters and resources is an accurate determination of the respective legal interests of both private landowners and the public in coastal areas. Various methods have been used in determining those interests, often with conflicting results. This article presents a comparative survey of past and present methods of water boundary determination, and concludes with a proposed Model Act to resolve the conflicts among the various methods in light of recent developments, such as the Supreme Court decision in Borax Consolidated Ltd. v. City of Los Angeles. In Borax, the term 'ordinary high water mark' was defined to mean the intersection of the tidal plane of mean high water with the shore. No particular relation to physical mark or vegetation line was required. As this article points out, however, coastal boundary line determination still varies from one jurisdiction to another. The authors hope the Model Act will help provide (1) uniform boundary determination guidelines, (2) development of a coastal survey methodology, and (3) implementation of a comprehensive program of coastal zone mapping. (Parrish-Florida)
W76-04355

SAMPLE FLOOD PLAIN ZONING ORDINANCE FOR LOCAL UNITS OF GOVERNMENT.
Minnesota Dept. of Natural Resources, St. Paul. League of Municipalities, Association of Cities.
For primary bibliographic entry see Field 6F.
W76-04356

FLOOD PLAIN MANAGEMENT FOR OREGON CITIES AND COUNTIES.
Oregon Univ., Eugene. Bureau of Governmental Research and Service.
For primary bibliographic entry see Field 6F.
W76-04357

ORDINANCE TO AMEND THE BUILDING CODE OF THE CITY OF GILLETTE, WYOMING.
For primary bibliographic entry see Field 6F.
W76-04358

AN ORDINANCE RELATING TO FLOOD PLAIN MANAGEMENT.
For primary bibliographic entry see Field 6F.
W76-04359

MINIMUM REQUIREMENTS FOR FLOOD CONTROL.
For primary bibliographic entry see Field 6F.
W76-04360

FLOOD PLAIN MANAGEMENT -- FPM-1 AND FLOOD INSURANCE PROGRAM.
Indiana Dept. of Natural Resources, Indianapolis.
For primary bibliographic entry see Field 6F.
W76-04361

MODEL FLOODWAY ORDINANCE (FLOODWAY REGULATION).
North Carolina General Assembly, Raleigh.
For primary bibliographic entry see Field 6F.
W76-04362

PROPOSED FLOOD DISTRICT ORDINANCE.
For primary bibliographic entry see Field 6F.
W76-04363

FLOOD HAZARD REGULATIONS (AMENDMENT TO THE BUILDING CODE).
For primary bibliographic entry see Field 6F.
W76-04364

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION ACT.
Alaska State Dept. of Environmental Conservation, Juneau.
For primary bibliographic entry see Field 5G.
W76-04365

ALASKA WATER QUALITY STANDARDS.
For primary bibliographic entry see Field 5G.
W76-04366

ARIZONA WATER POLLUTION CONTROL LAW.
Arizona State Dept. of Health, Phoenix. Environmental Health Service.

For primary bibliographic entry see Field 5G.
W76-04367

ARIZONA RULES AND REGULATIONS FOR SEWERAGE SYSTEMS AND WASTE TREATMENT WORKS.
Arizona State Dept. of Health, Phoenix.
For primary bibliographic entry see Field 5G.
W76-04368

CALIFORNIA WATER POLLUTION CONTROL LAWS.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W76-04369

REQUIREMENTS AND RESPONSIBILITIES OF THE STATE WATER RESOURCES CONTROL (REGULATIONS FOR IMPLEMENTATION OF THE ENVIRONMENTAL QUALITY ACT OF 1970).
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W76-04370

COLORADO WATER QUALITY CONTROL ACT.
Colorado Dept. of Health, Denver.
For primary bibliographic entry see Field 5G.
W76-04371

COLORADO REGULATIONS FOR THE STATE DISCHARGE PERMIT SYSTEM.
Colorado Water Quality Control Commission, Denver.
For primary bibliographic entry see Field 5G.
W76-04372

COLORADO WATER QUALITY STANDARDS.
Colorado Water Quality Control Commission, Denver.
For primary bibliographic entry see Field 5G.
W76-04373

COLORADO STANDARDS FOR THE DISCHARGE OF WASTES.
Colorado Water Pollution Control Commission, Denver.
For primary bibliographic entry see Field 5G.
W76-04374

COLORADO REGULATIONS FOR EFFLUENT LIMITATIONS; TREATMENT WORKS SITE APPROVAL REGULATION; STORM SEWER DISCHARGE REGULATIONS.
Colorado Water Quality Control Commission, Denver.
For primary bibliographic entry see Field 2G.
W76-04375

HAWAII ENVIRONMENTAL QUALITY LAW.
Hawaii State Office of Environment Quality Control, Honolulu.
For primary bibliographic entry see Field 5G.
W76-04376

KANSAS UNDERGROUND STORAGE REGULATIONS.
Kansas State Board of Health, Topeka.
For primary bibliographic entry see Field 5G.
W76-04377

KANSAS WATER POLLUTION CONTROL LAWS.
Kansas State Board of Health, Topeka. Div. of Enviornmental Health.
For primary bibliographic entry see Field 5G.
W76-04378

KANSAS WATER QUALITY CRITERIA.
For primary bibliographic entry see Field 5G.
W76-04379

MICHIGAN LIQUID INDUSTRIAL WASTE DISPOSAL ACT.
For primary bibliographic entry see Field 5G.
W76-04380

MICHIGAN OIL SPILLAGE REGULATIONS.
For primary bibliographic entry see Field 5G.
W76-04381

MICHIGAN CLEANING AGENTS REGULATIONS.
For primary bibliographic entry see Field 5G.
W76-04382

MONTANA REGULATION ON WATER POLLUTION FROM LIVESTOCK FEEDING.
Montana Board of Health and Environmental Sciences, Helena.
For primary bibliographic entry see Field 5G.
W76-04383

NEBRASKA ENVIRONMENTAL PROTECTION ACT.
Nebraska State Dept. of Environmental Control, Lincoln.
For primary bibliographic entry see Field 5G.
W76-04384

INLAND WETLANDS: TECHNICAL DEFINITIONS DIRECTED TOWARD EMERGING POLICY ALTERNATIVES,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 6B.
W76-04389

HOW TO DISPOSE OF MANURE AND STAY OUT OF COURT,
For primary bibliographic entry see Field 5E.
W76-04435

AMENDING THE WILD AND SCENIC RIVERS ACT.
House of Rep Conference Rep No. 93-1645, 93d Cong 2d Sess., Dec. 19, 1974. 8 p.

Descriptors: *Wild River Act, *Federal government, *Legislation, *Wild rivers, *National resources, Governments, Rivers, Water law, Legal aspects, Bodies of water, United States, Conservation, Running waters, Inland waterways, Mississippi River, Surface waters, Navigable rivers, Resources, Costs.
Identifiers: *Wild and Scenic Rivers Act, *Lower St. Croix River Act.

A Congressional conference committee has recommended that the following rivers or segments thereof be studied to determine whether they should be added to the National Wild and Scenic Rivers System: the American and Tuolumne, California; An Sable and Manistee, Michigan; Cahaba and West Fork of the Sipsey Fork, Alabama; Colorado, Colorado and Utah; Kettle and Upper Mississippi, Minnesota; Wisconsin, Wisconsin; Illinois, Oklahoma, John Day and South Fork Owyhec, Oregon; Shepaug, Connecticut; Nolichuckey, Tennessee and North Carolina; Clark Fork, Snake and Sweetwater, Wyoming; and Big Thompson, Cache la Poudre, Conejos, Elk, Encampment, Gunnison, Los Pinos, Piedre, Lampa, and Dolores, Colorado. The committee adopted language providing for a study period ending October 2, 1979, for the above rivers, except that the period for the Dolores will end January 3, 1976. An authorization ceiling of $2,175,000 was set for the study of the designated rivers. The conferees further agreed to amend the Lower St. Croix River Act of 1972 by increasing to $19,000,000 the authorization for the acquisition and development of land along the segment of the river which is to be administered by the Secretary of Interior. (Schilling-Florida)
W76-04437

MODIFYING SECTION 204 OF THE FLOODING CONTROL ACT OF 1965.
House of Rep Comm. on Public Works, Rep No. 93-1483, 93d Cong, 2d Sess, Nov. 19, 1974. 16 p.

Descriptors: *Multiple purpose projects, *Federal government, *Legislation, *Flood control, *Oregon, Water, Water law, Legal aspects, United States, Local governments, Governments, Governmental interrelations, Floods, Costs, Reservoirs.
Identifiers: *Flooding Control Act of 1965.

The House Committee on Public Works has recommended passage of a bill (5,3537) to modify section 204 of the Flood Control Act of 1965. The purpose of the bill is to authorize modifications to the Willow Creek Project in Oregon which have become necessary subsequent to the original project authorization. The authorized plan consists of a multiple purpose reservoir on Willow Creek, together with limited downstream channel improvement. During post-authorization studies, it was determined that the most practicable project for flood control would be a storage reservoir without the channel improvement. Accordingly, the authorized plan has been modified to provide a reservoir of the same capacity but with increased flood control storage capabilities. The water supply storage and channel improvement provisions have been deleted. The recreation development and fish and wildlife purposes have been reduced along with irrigation storage. Enactment of this legislation will result in no additional cost to the government. A special report of the Chief of Engineers is included in this publication. (Schilling-Florida)
W76-04438

TO EXPAND THE INDIANA DUNES NATIONAL LAKESHORE (HR 3571).
Hearing--Subcomm. on National Parks and Recreation--Comm. on Interior and Insular Affairs, House of Representatives, 93rd Congress, 2d Session, June 17, 1974. 292 p.

Descriptors: *National lakeshore, *Conservation, *Federal government, *National parks, *Water resources development, Water conservation, Legal aspects, Legislation, Industries, Water management(Applied), Water policy, Water pollution, Water pollution control, Water law, Water quality, Water quality control, Recreation, Water resources, Water conservation, Organizations, Agencies, Fish conservation, Fishing, Natural resources, Protection, Indiana.
Identifiers: *Indiana Dunes National Lakeshore.

Considered here are proposed amendments to an act establishing the Indiana Dunes National Lakeshore. The proposed amendments would provide for the addition of approximately 5230 acres to the lakeshore. The Subcommittee on National Parks and Recreation received statements and testimony from sixty-four witnesses including representatives of conservation groups generally in favor of the proposed amendments and representatives of industries generally opposed to the proposed amendments. The subcommittee also received a statement from the Department of the Interior opposing enactment of the proposed amendments on grounds that the additon of the land to the lakeshore is neither of national sig-

nificance nor necessary for the fulfillment of the lakeshore's primary purpose. Furthermore, there are existing demands for funds to acquire areas already authorized in the National Park System. (Nursey-Florida)
W76-04439

STORM KING MOUNTAIN (PUMP STORAGE PLANT).
For primary bibliographic entry see Field 5G.
W76-04440

PERMITS OF ACTIVITIES IN NAVIGABLE WATERS OR OCEAN WATERS.
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04441

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04442

VARIANCE PROCEDURES IN EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04443

WATER QUALITY AND POLLUTANT SOURCE MONITORING.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04444

GLASS MANUFACTURING POINT SOURCE CATEGORY--PROPOSED EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04445

STATE COASTAL ZONE MANAGEMENT PROGRAM.
National Oceanic and Atmospheric Administration, Washington, D.C.
40 Fed Reg (8546-48 (1975), 3 p.

Descriptors: *Coordination, *Inter-agency cooperation, *Project planning, *Administrative agencies, *State governments, Standards, Land use, Coasts, Management, Water, Communication, Programs, Federal government, Administrative decisions.
Identifiers: *Coastal Zone Management Act of 1972.

Interim regulations have been promulgated for the implementation of cited provisions of the Coastal Zone Management Act of 1972. Early in the development of its state program, each state agency should contact all relevant Federal agencies listed in these regulations, or determined by the Administrator of the National Oceanic and Atmospheric Administration, for the purpose of arranging for the participation of that Fedral agency in the development of the state program. Throughout the development of the state program, the state and relevant Federal agency should remain in contact. Furthermore, state programs must be submitted to the Administration for review to insure compliance with criteria prescribed in the Act. The regulations also provide for the preparation of a draft environmental impact statement by the Administrator if the state program appears to comply with the criteria of the Act, and for the submission of such statement to each relevant Federal agency for review and comment. The Administrator shall publish his final approval or disapproval of the state programs in the Federal Register. (Segall-Florida)
W76-04446

NONFERROUS METALS MANUFACTURING POINT SOURCE CATEGORY (EFFLUENT LIMITATIONS AND GUIDELINES).
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04447

ANADROMOUS FISHERIES CONSERVATION DEVELOPMENT AND ENHANCEMENT.
National Marine Fisheries Service, Washington, D.C.
40 Fed Register 6786-87 (1975), 2 p.

Descriptors: *Commercial fishing, *United States, *Anadromous fish, *Projects, Grants, *Fisheries, Great Lakes, Spawning, Oceans, Environment, Streams, Fish, Wildlife, Recreation, Harvesting, Marketing, Construction, Facilities, Resources, Research, Development, Real property, Safety.
Identifiers: *Anadromous Fish Conservation Act.

Pursuant to the Anadromous Fish Conservation Act, the Secretary of the Interior and the Secretary of Commerce have proposed revisions to administrative procedures of Part 401 of Title 50, Code of Federal Regulations. The purpose of these proposed rules is to govern the granting of federal assistance to eligible states for projects relating to recreational fisheries and commercial fisheries. The rules prohibit the financing of specified projects and require that projects be completed with reasonable promptness. Also all projects are subject to federal inspection. Provisions governing record keeping are proposed, as well as provisions for determining patent rights in any inventions or discoveries resulting from work under project agreements entered into pursuant to the Act. (Segall-Florida)
W76-04448

PREPARATION OF ENVIRONMENTAL STATEMENTS - GUIDELINES.
Agricultural Stabilization and Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 6G.
W76-04449

CIVIL WORKS PROJECTS: LAKESHORE MANAGEMENT.
Corps of Engineers, Washington, D.C.
39 Fed Reg 43399-404 (1974), 6 p.

Descriptors: *Water resources development, *Lake shores, *Environmental control, *Environmental engineering, *Management, Regulation, Administrative agencies, Water resources, Water quality Water pollution control, Recreation, Public lands, Public access, Public benefits, Public health, Safety, Indian reservations, Federal jurisdiction, Federal Water Pollution Control Act, Projects, Adoption of practices, Conservation, Lakes.

The Department of the Army, acting through the Corps of Engineers, herein proposes the policy, practice and procedure to be followed by all Corps of Engineers field operating agencies in connection with the protection of desirable environmental characteristics of Civil Works lake projects, and the restoration of shorelines where degradation has occurred through private exclusive use. The latter category, however, excludes any lake project lands where application of the proposed procedures would result in an infringement of existing Indian rights. The Corps desires to establish and maintain acceptable fish and wildlife habitats for all lakes under its jurisdiction and to assure the public safety of all those who use lake waters to which the Corps holds an easement. The proposal includes preparation of a Lakeshore Management Plan for all Corps lake projects where private recreation facilities exist, but a plan will not be required for new lakes or completed projects where no private facilities exist. The Lakeshore Management Plan also provides for: (1) lakeshore allocation; (2) public recreation area regulation; (3) prohibited access areas; and (4) public participation in the formulation and preparation stages. (Welch-Florida)
W76-04450

SUSQUEHANNA RIVER BASIN COMMISSION - REVIEW OF PROJECTS.
Susquehanna River Basin Commission, Mechanicsburg, Pa.
39 Fed Reg 41973-76 (1974), 6 p.

Descriptors: *Project planning, *River basin commissions, *Interstate commissions, *Administrative agencies, *River basin development, River basins, River regulation, Rivers, River systems, Interstate rivers, Inter-agency cooperation, Inter-basin transfers, Water resources development, Legal aspects, Programs, Projects, Water policy, Administration, Federal project policy, Jurisdiction, Maryland, New York, Pennsylvania.
Identifiers: *Susquehanna River Basin Commission, Susquehanna River Basin.

To implement the program and planning system of the Susquehanna River Basin Commission the proposed rules set forth the purposes and scope of review, application procedures and hearing procedures for the review of any projects affecting the water resources of the Susquehanna River Basin. The rules were adopted and made effective June 1, 1975. These rules provide that no person, association, corporation or other non-governmental entity shall construct or operate any project affecting the resources of the basin prior to review and approval of the Commission of the project. While setting forth procedures for application and review of the proposed projects, the rules also provide for development of 'agreements of understandings' between the Commission and the various agencies of the signatory states, Maryland, New York, and Pennsylvania. These agreements may provide for joint review of projects or allow permits issued by signatory agencies to be considered as Commission approval if issued pursuant to an agreement. Review by the Commission is not required for any project which, prior to this effective data, has been issued a permit by a signatory party allowing completion through the project's final construction phase. (Welch-Florida)
W76-04451

OIL AND HAZARDOUS SUBSTANCE LIABILITY.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04452

RUBBER PROCESSING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04453

WATER QUALITY STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W76-04454

ATLANTIC BLUEFIN TUNA, PROPOSED 'THREATENED STATUS'.
Fish and Wildlife Service, Washington, D.C.
40 Fed Reg 14767-68 (1975), 2 p.

Descriptors: *Commercial fish, *Atlantic Ocean, *United States, *Fish conservation, *Fish, Fishing, Investigations, Canada, Recreation, Wildlife, Data collections, Management, Fisheries, Conservation, Jurisdiction, Boats, Environment, Spawning.
Identifiers: *Atlantic bluefin tuna, *Endangered Species Act of 1973.

The status and welfare of the Atlantic bluefin tuna stocks have been the subject of discussion in recent years, domestically and internationally. Although the data now available are inadequate to positively determine the status of these stocks, they convinningly indicate that adult Atlantic bluefin tuna are substantially depleted in number from previous years. Because of this depletion, the Director of the National Marine Fisheries Service, in consultation with the Director of the United States Fish and Wildlife Service, has issued a notice of proposed determination, pursuant to the Endangered Species Act of 1973, that the Atlantic bluefin tuna is a threatened species and that it be added to the threatened species list under Part 17, Subchapter B of Chapter I, Title 50 of the Code of Federal Regulations.
W76-04455

ATLANTIC BLUEFIN TUNA (THREATENED SPECIES--FISH).
National Oceanic and Atmospheric Administration, Washington, D.C.
40 Fed Reg 14777-78 (1975), 2 p.

Descriptors: *Commercial fishing, *International waters, *Standards, *Fish conservation, *Management, Marine animals, Conservation, United States, Jurisdiction, Nets, Wildlife, Facilities, Tagging, Export, Regulation, Fish, Federal jurisdiction.
Identifiers: *Atlantic bluefin tuna, Angling, Purse seining.

The Department of Commerce has proposed that the Atlantic bluefin tuna be listed as threatened species. In anticipation of and in the event that the Atlantic bluefin tuna is so listed, the Director of the National Marine Fisheries Service proposes to establish these regulations concernin the taking of Atlantic bluefin tuna. The regulations specify the total annual catch quotas, by purse seining and by other method. They also propose that it be made unlawful to take certain Atlantic bluefine tuna under a specified size. Other provisions govern allowable incidental takings and open and closed seasons for different methods of taking. Finaly, general requirements for reporting and tagging are proposed. (Segall-Florida)
W76-04456

STATE V. YELSEN LAND CO., INC. (TITLE TO TIDELANDS).
216 S E 2d, 876-879 (SC 1975), 4 p.

Descriptors: *South Carolina, *Boundary disputes, *Ownership of beds, *High water mark, *Judicial decisions, Boundaries(Property), Low water mark, Legal aspects, Shores, Water law, State governments, Common law, Water rights, Tides, Tidal waters, Navigable waters, Atlantic Ocean, Water levels, Real property.

South Carolina brought an action against claimants to certain tidelands to settle title to the tidelands. The grants by which claimants' predecessors obtained title to the lands described the boundaries to be a 'a small inlet', 'the Atlantic Ocean', a 'sound or creek', and the 'waters of Charleston Harbor'. The Supreme Court of South Carolina held that the State is presumed to be the owner of the tidelands. In the absence of specific language either in the grant or upon the plat, showing that is was intended to convey land below the high water mark, the grant would only convey land to the high water mark. Furthermore, since the grants did not convey the tidelands, claimants could not assert title based on certain South Carolina possession statutes. (Nursey-Florida)
W76-04457

GEORGIA WATER QUALITY CONTROL ACT.
Ga Code Ann, sec 17-503, 17-505, 17-510, 17-511, 17-512, 17-516.1, 17-518, 17-521.2, 17-528.1 (Supp 1974), 10 p.

Descriptors: *Georgia, *Administrative agencies, *Water quality standards, *Water pollution control, Water, Water law, Legal aspects, Legislation, Governments, State governments, Water pollution, Water pollution sources, Pollutants, Wastes, Waste treatment, Abatement, Penalties(Legal), Water pollution treatment, Water policy.
Identifiers: *Georgia Water Quality Control Act, *Effluent limitations, Point sources, Non-point sources(Pollution), Hazardous substances(Pollution), State policy.

Under the Georgia Water Quality Control Act, the State Water Quality Control Board may conduct research on methods to prevent and control pollution, cooperate with and enter into agreements with other governmental units on water quality matters, and establish or revise standards for the purity of waters within the state. Representative provisions of the Act include: (1) it shall be unlawful to use any water of the State for the disposal of sewage or other wastes, except in compliance with rules and regulations established under this Chapter; (2) permits are required for construction or modification of sewage or waste disposal systems, and for the discharge of pollutants from point sources or non-point sources; (3) effluent limitations may be required as a condition in permits issued for the discharge of pollutants; (4) such permits shall have a fixed term not to exceed five years, and may be renewed pursuant to the procedures set forth in this Chapter; (5) the Director of the Division of Environmental Protection may require operators or facilities which result in the discharge of pollutants to undertake certain monitoring, recording, and reporting activities; and (6) the Department of Natural Resources is authorized to expend funds for water and sewage treatment facilities to serve planned communities certified as eligible for State development assistance. (Schilling-Florida)
W76-04458

GROUNDWATER USE ACT OF 1972, AMENDMENTS.
Georgia Code Ann, sec 17-1101 through 17-1115 (Supp 1974), 9 p.

Descriptors: *Georgia, *Groundwater, *Water users, *Administrative agencies, *Legislation, Governments, State governments, Surface waters, Aquifers, Water, Water law, Water supply, Legal aspects, Penalties(Legal), Permits, Regulation, Wells, Water wells, Well regulations, Water resources, Groundwater resources, Aquifer management.
Identifiers: *Georgia Groundwater Use Act of 1972, Injunctive relief, Administrative regulations.

Under the Groundwater Use Act of 1972, the Environmental Protection Division of the Department of Natural Resources shall prepare proposed regulations containing such of the provisions included in this Chapter as the Division finds appropriate concerning the use of groundwater. A permit obtained from the Division shall be required for use of groundwater in excess of 100,000 gallons per day. Such permits shall be issued without a hearing if such water is not consumptively used. In other cases, hearings and appeals shall be conducted in accordance with the Executive Reorganization Act of 1972 and the Administrative Procedures Act. Factors to be considered by the Division in making permit decisions are included in this Chapter, as are provisions concerning the duration, renewal, and transfer of permits, and the use of water pending issuance of permits. In certain circumstances of the Division may seek an order enjoining violations of this Chapter. The Division may also issue emergency orders when an emergency situation is found to exist. This Chapter shall not apply to persons using water for agricultural purposes or poultry processing purposes, and shall not change or modify existing law with respect to surface waters. (Schilling-Florida)
W76-04459

WATER RECREATION ACT OF 1973.
Georgia General Assembly, Atlanta.
Georgia Code Ann, sec 17-1201 through 17-1205 (Supp 1974), 3 p.

Descriptors: *Georgia, *Water sports, *Recreation facilities, *Boating, Water, Water law, Legal aspects, Legislation, Governments, State governments, Penalties(Legal), Administrative agencies, Damages, Natural resources, Bodies of water, Bonding, Recreation, Recreation demand, Regulation.
Identifiers: *Georgia Water Recreation Act of 1973.

The Georgia General Assembly has found that massive water-related recreational events may cause considerable damage to natural resources if improperly handled. Furthermore, the increasing popularity of water-related recreation will bring a parallel increase in the number and intensity of such events. Therefore, the General Assembly has declared that events of this type must be regulated so as to insure proper handling and minimum damage to natural resources. For the purpose of this Chapter, unless the context clearly require otherwise, 'Department' means the Department of Natural Resources, and 'Water event' means any advertised event likely to attract 5000 or more people onto State waters other than lakes. The person sponsoring a water event must provide a bond with the department not to exceed $10,000 issued by a surety company authorized to transact business in the State. This shall be the only bond required for said water event, and the department shall be the sole judge as to the performance. Nothing in this Chapter abrogates any existing rights under Georgia law entitling a person to bring a civil action for damages to person or property. (Schilling-Florida)
W76-04460

WATER SUPPLY QUALITY CONTROL.
Georgia Code Ann., sec. 88-2603, 88-2603.1, 88-2603.2, 88-2605.1, 88-2611, 88-2613, 88-2614.1, 88-2615.1 (Supp. 1974).

Descriptors: *Georgia, Water quality, *Water quality control, *Water supply, *Legislation, State governments, Local governments, Governmental interrelations, Governments, Water, Water law, Legal aspects, Penalties(Legal), Water storage, Regulations, Water management(Applied), Water resources, Water works, Potable water, Flouridation.
Identifiers: *Water supply quality control.

The 'Water Supply Quality Control' chapter of the Georgia code gives the Board of Natural Resources additional powers and duties concerning water supply quality control. Included, among others, is the power to establish water quality standards, to issue certificates covering the operation of public water supply systems, to collected and disseminate information concerning water quality in the State, to adopt rules and regulations governing the installation and operation of water supply systems, to deal with other governmental units on matters concerning water supply quality, and to require the flouridation of potable public water supplies in incorporated communities. However,

political subdivisions may choose by referendum to remove themselves from the fluoridation requirement. No water authority shall be required to comply with the fluoridation provisions unless the State has made funds available to cover the cost of necessary equipment, the installation thereof, and a six-month supply of necessary chemicals. Civil penalties may be imposed for violation of the provisions of this Chapter. (Schilling-Florida)
W76-04461

COASTAL INDUSTRIAL WATER AUTHORITY V. YORK (OWNERSHIP OF SUBMERGED LAND ADJACENT TO HOUSTON SHIP CHANNEL).
520 SW2d, p 494-503 (Court of Civil Appeals of Texas, 1975). 10 p.

Descriptors: *Texas, Erosion, *Ownership of beds, *Judicial decisions, *Boundaries(Property), Boundary disputes, Common law, Water law, Eminent domain, State governments, Local governments, Legal aspects, Navigable waters, Navigable rivers, Beds under water, Seashores, High water mark, Low water mark, Bodies of water, Bank erosion, Water rights, Accretion(Legal aspects), Real property.
Identifiers: *Coastal waters, *Submerged lands.

Plaintiff landowner brought suit against defendant coastal water authority to determine ownership of submerged land. Plaintiff received title to property in question by general warranty deed in which one boundary of the proprty was described as the 'water's edge of the Houston Ship Channel'. After the conveyance the water's edge moved inland submerging a portion of plaintiff's land. The coastal authority contended that the submerged land was lost to plaintiff and had become property of the State of Texas. On appeal the Court of Civil Appeals mentioned the common law rule that when, due to erosion, a river comes to occupy land previously dry, the owner loses title to that land. However, the court held the better rule to be that where lands are privately owned and bordering on a seashore, or an arm thereof, or other navigable waters, the mere fact that a portion of such lands become submerged does not deprive the owners of title to the land so long as the boundaries can be reasonably identified. (Nursey-Florida)
W76-04462

BERRY V. SCHNEIDER (ACTION BY OWNERS OF LAKE PROPERTY TO ENJOIN MAINTENANCE OF DAMS ON PROPERTY OWNED BY DEFENDANTS).
327 N.E. 2d, p 143-145 (Fifth District Appellate Court of Illinois, 1975). 3 p.

Descriptors: *Earth dams, *Flooding, *Illinois, *Flood damage, Backwater, Dam construction, Flow control, Drainage districts, Lakes, Judicial decisions, Penalties(Legal), Water spreading, Water, Water law, Legal aspects, Damages, Dams.
Identifiers: *Water courses.

The defendants erected an earthen dam on their own land which raised the level of an existing lake, and which, following a period of heavy rains, caused the flooding of hundreds of acres of plaintiff's land. The plaintiffs filed a complaint asking that the dam be opened and the water level of the lake be maintained at sea level elevation. The trial court so ordered. Shortly thereafter, the intervenors filed their petition to intervene together with motions to set aside the decreee and to dismiss the plaintiff's complaint. The major contentions of the intervenors were that the decree would allow a portion of the lake to be drained, thus depriving them of its use; the relief sought would cause irreparable damage to their interests; and the decree would result in an assessment to them from a sewer drainage district in violation of an earlier court decree. The trial court granted the petition to intervene but denied the motions to set aside the decree and to dismiss the complaint. On appeal from this decision, the Appellate Court affirmed, finding that adverse effects on intervenors' interest were not a basis for denying plaintiffs their legal right to alter an illegal condition. (Hoffman-Florida)
W76-04463

SPRINGFIELD MARINE BANK V. POLLUTION CONTROL BOARD (APPEAL FROM DENIAL OF VARIANCE FROM BAN ON FURTHER CONNECTION OF SANITARY DRAINAGE OUTLETS TO SEWER).
327 N.E. 2d. p 486-492 (Fourth District Appellate Court of Illinois, 1975). 7 p.

Descriptors: *Illinois, *Sewage disposal, *Economic justification, *Environmental sanitation, Water pollution control, Public health, Judicial decisions, Permits, Legal aspects, Sewage, Sewage treatment, Legal review, Water, Water law, Land, Land development, Land use.
Identifiers: *Sewer connections.

Petitioner is the trustee of an Illinois land trust, the beneficial interest of which is in a joint venture. The business involves the purchase, platting, and development of real estate for residential purposes; and the sale of the unimproved lots. Petitioner was unable to obtain a permit to connect its sewage drainage outlet to a sewer because of a ban on further connections by the Environmental Protection Agency (EPA). A variance from that ban was denied by the Pollution Control Board and the petitioner appealed. Petitioner asserted it was led by an EPA letter to believe that the ban was only temporary. In addition, petitioner had been granted a conditional permit to construct the subdivision sewers but not to use them. As a result of the letter and conditional permit, petitioner procured a million dollar loan, two thirds of which was used to procure other land to develop. Because of these facts, petitioner contended that the Board's decision was arbitrary and unreasonable. The court affirmed the decision, however, holding that the Board's finding, that the economic hardship to the trust did not outweigh harm to the public environment if variance was granted, was adequately supported by the evidence. (Hoffman-Florida)
W76-04464

SPRINGFIELD MARINE BANK V. POLLUTION CONTROL BOARD (APPEAL FROM DENIAL OF VARIANCE FROM BAN ON FURTHER CONNECTIONS OF SEWER OUTLETS TO SEWER).
327 NE 2d, p 492-494 (Fourth District Appellate Court of Illinois, 1975). 3 p.

Descriptors: *Illinois, *Sewage disposal, *Water pollution control, *Public health, *Judicial decisions, Environmental sanitation, Legal aspects, Permits, Sewerage, Sewage treatment, Sewage disposal, Legal review, Overflow, Overburden, Costs, Sewers, Municipal water.
Identifiers: *Sewer taps.

In July 1972, the Environmental Protection Agency imposed a ban on new connections to the sanitary sewers in the southwest Springfield area because of sewage overflow problems. Petitioner, trustee of an Illinois land trust, filed with the Pollution Control Board for a variance from the sewer tap ban in December 1973. He asserted that the beneficiary of the trust, a development company, had been led to believe that the ban was only temporary. Furthermore, the company had been granted a conditional permit to construct the subdivision sewers but not to use them. This had caused the company to stockpile over a half million dollar's worth of building supplies necessary to construct the sewers. The Board, nevertheless, denied the permit resulting in this appeal. The appellate court affirmed, holding that the Board's finding that the economic hardship to the trust did not outweigh the harm that might befall the public if a variance were granted was not contrary to the manifest weight of evidence. While the court recognized that petitioner would suffer losses, they were not found to be sufficient to outweight possible harm from sewage overflows. (Hoffman-Florida)
W76-04465

LEASE PROPERTIES, INC., V. SHINGLETON (ACTION FOR DAMAGE AND INJUNCTIVE RELIEF FOR ALLEGED WRONGFUL CLOSING).
212 S.E. 2d, p 683-685 (Court of Appeals, North Carolina, 1975). 3 p.

Descriptors: *North Carolina, *Easements, *Drainage, *Surface runoff, Legal aspect, Judicial decisions, Surface drainage, Overland flow, Watercourses(Legal aspects), Penalties(Legal), Water law, Water, Drainage effects, Drainage water, Streams, Riparian rights, Riparian land, Obstruction to flow.
Identifiers: *Dominant land, *Servient land, Injunctive relief.

Plaintiff sought damages for the alleged wrongful closing of a drainage ditch by the defendants and requested an injunction requiring the defendants to reopen the ditch. In its complaint, plaintiff alleged ownership of an easement by implication across the defendants land for drainage purposes. Alternately, plaintiff argued that defendant's land was servient to plaintiff's dominant land. Evidence offered by the defendants demonstrated that their land was higher than plaintiff's land, and that there was very little water running through the ditch until the plaintiff paved a large portion of its land. From judgement in favor of plaintiff, defendant appealed. The Court of Appeals affirmed, finding that there was no evidence of any diversion of surface water by the plaintiff. The Court noted that while individual cannot divert water from its natural course so as to damage another, he may accelerate and increase its flow. As long as the drainage results along the natural watercourse the servient proprietor may not complain, even though natural barriers on the higher land have been cut down and the flow of water both accelerated and increased. Thus, the paving of the dominant land by plaintiff did not affect the duty owned by defendant, the servient landowner. (Hoffman-Florida)
W76-04466

NEWARK V. NATURAL RESOURCE COUNCIL, DEPT. OF ENVIRONMENTAL PROTECTION (ACTION TO REVIEW MAPS PUBLISHED BY STATE AGENCY TO INDICATE STATE OWNERSHIP OF RIPARIAN LANDS).
336 A2d p 46-54 (Superior Court of New Jersey, 1974). 9 p.

Descriptors: *New Jersey, *Grasslands, *Riparian land, *Topographic mapping, Mapping, Ecology, Legal aspects, Cross-sections, Land tenure, Land use, Real property, Judicial decisions, Water, Water law, Legal review, Riparian rights, Topography, Land classification, State governments.
Identifiers: *Uplands, Certification.

The Natural Resource Council was directed by State statute to undertake title studies and surveys of the meadowlands throughout the State, and to determine and certify those lands which it finds are state-owned lands. Upon completion of each separate study and survey, the Council was to publish a map clearly indicating those lands designated by the Council as state-owned. When the maps were published they contained three categories: upland, areas not claimed by the state; riparian, areas claimed by the state; and hatched, areas which may be subject to possible claims by the state. This action was a consolidated appeal seeking summary judgement that the hatched

areas used on the maps were not authorized by the statute, since they did not clearly indicate those lands to which the State claimed title, and those which the State did not. The court granted the summary judgement and ordered the Council to prepare and publish a new overlay clearly indicating the State's riparian claim for each map of the areas designated as hatched. In so holding, the court found the use of hatched-marked areas transformed the legislative intent of unequivocal notice into an ambiguity which was both regressive and unfair. (Hoffman-Florida)
W76-04467

SIBSON V. STATE (APPEAL BY OWNERS OF SALT-MARSH FROM DENIAL BY SPECIAL BOARD OF PERMIT TO FILL SALT-MARSH).
336 A.2d, p 239-243 (Supreme Court of New Hampshire, 1975). 5 p.

Descriptors: *Eminent domain, *Salt marshes, *Lanfills, *Judicial decisions, Property value, Constitutional law, Economic impact, Costs, Permits, Environmental effects, Regulations, Marshes, Marsh management, Habitats, Real property, Wildlife management, *New Hampshire, Ecology, Land use, Land reclamation.
Identifiers: Ecological assets, State police power.

In 1968, when plaintiffs purchased a tract of saltmarsh, there was no statute requiring a permit to fill in the land. In 1970 the definition of marshland was amended by statute and a permit requirement instituted. When plaintiff applied for a permit, the board denied the request, finding plaintiffs' land to be a valuable ecological asset of the seacoast area that would be irreparably damaged by the proposed landfill. On appeal plaintiffs argued that this denial rendered their saltmarsh economically useless and therefore constituted a taking. They relied on a U.S Supreme Court case that declared compensation to be due a landowner when a regulation destroys all or substantially all of his property's value. The court rejected this argument, holding that an owner has no unlimited right to change the essential natural character of his land in order to use it for purposes for which it is unsuited in its natural state and which injure the rights of others. Consequently the denial of the permit was a valid exercise of the state police power and did not constitute a taking. (Hoffman-Florida)
W76-04468

WATER RESOURCES DEVELOPMENT ACT OF 1974.
PL 93-251; 88 Stat. 12, U.S. Code Cong. and Admin. News, p 14-47, 1974. 34 p.

Descriptors: *Water resources development, *Water works, *Water supply development, *Government supports, Rivers and Harbors Act, Legislation, Water control, Water utilization, Water conservation, Water policy, Water allocation(Policy), Research and development, Comprehensive planning, Alternate water use, Area redevelopment, Resources, Potential water supply, Legislation, Multi-purpose projects.
Identifiers: *Water Resources Development Act, Flood Control Act.

This legislation authorizes the Secretary of the Army, acting through the Chief of Engineers, to take numerous and varied actions related to water resources development across the nation. The Act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and other purposes. Title I of the Act presents all of the authorized projects, most of which are closely connected with river basin programs already underway across the nation. Title I also contains numerous amendments to existing legislation, such as the Flood Control Acts and the Rivers and Harbors Acts, necessary to allow implementation of newly authorized projects. Title II provides $764 million in appropriations for the prosecution of a comprehensive plan of development for specified river basins under the jurisdiction of the Secretary of the Army. (Hoffman-Florida)
W76-04469

WATKINS V. COBB COUNTY COMMISSION (DAMAGE CAUSED BY SEWER OVERFLOW INTO CONDOMINIUM).
217 SE 2d 298-304 (Ga. Ct. App. 1975). 7 p.

Descriptors: *Obstruction to flow, *Georgia, *Judicial decisions, *Sewerage, *Overflow, Legal aspects, Negligence, Eminent domain, Local governments, State governments, Permits, Construction, Sewage, Sanitary engineering, Waste water disposal, Storm drains.
Identifiers: *Nuisance(Legal aspects), Sovereign immunity.

Plaintiff landowners brought an action against defendants county commission and a land developer for damage caused to plaintiffs' land by overflow from a storm sewer system. Plaintiffs contended that defendant developer, while making a tie-in from its condominiums to the county sewage system, caused a blockage of the system resulting in the overflow. The trial court granted summary judgement in favor of the county and plaintiffs appealed. The Georgia Court of Appeals held that the maintenance of the sewage system was a county function for which the county could not be held liable in negligence; nor could the county be held liable on a nuisance theory since the condition was promptly abated. Finally, the court held that the county could not be held liable on a theory of 'taking' plaintiffs' property without compensation in that county authorities had not been shown to be responsible for the taking not to ratify it. (Nursey-Florida)
W76-04470

STATE V CONSOLIDATED COAL CO (STATUTORY PROHIBITION AGAINST DEPOSITION OF SEDIMENT IN PUBLIC WATERS BY STRIP-MINING HELD DENIAL OF DUE PROCESS).
335 NE2d 403-14 (Harrison County Ct, Ohio 1974). 12 p.

Descriptors: *Sedimentation, Standards, *Ohio, *Constitutional law, *Strip mines, Legislation, Penalties(Legal), Legal aspects, Water law, Deposition(Sediments), Sediment distribution, Regulation, Water pollution control, *Water quality standards, Environmental effects, Stripmine wastes, Judicial decisions.
Identifiers: Criminal penalties, *Due process.

Defendant coal company was charged with criminal violation of a state statute prohibiting the deposition of sediments in public waters by those engaged in strip-mining activities. At trial, defendant contended that the statute was not only so vague and imprecise, as to fail to state ascertainable standards of guilt necessary for criminal conviction, but also in violation of due process, since defendant would be unable to carry on its business if it was required to prevent the natural occurrence of sedimentation. Plaintiff State, however, argued that because of defendant's expertise in this area, defendant understood the meaning of the charges brought, even if the wording of those charges was somewhat vague and imprecise. The State also argued that the statute did not violate due process or constitute an abuse of legislative authority since it was enacted to prevent an important problem--environmental degredation. The Harrison County Court of Ohio rejected the States' contentions, striking down the statute as unconstitutional for vagueness, and in violation of due process. In addition, the court found improper the statute's broad delegation of authority to the chief of the Division of Reclamation. (Hoffman-Florida)
W76-04471

YOUNG V ETHYL CORP (DAMAGES CAUSED BY LOSS OF VALUABLE SALT WATER BRINE BECAUSE OF INJECTION AND PRODUCTION WELLS ON SURROUNDING PROPERTY).
521 F2d 771-75 (8th Cir. 1975). 5 p.

Descriptors: *Arkansas, Mineralogy, *Injection wells, *Bromine, *Adjacent land owners, Induced infiltration, Judicial decisions, Common law, Drainage, Seepage, Reservoirs, Natural resources, Land tenure, Reasonable use, Mining, Land resources.
Identifiers: *Mineral rights, *Production wells.

Plaintiff landowner sought an injunction and damages or an accounting for defendant corporation's forcible removal of valuable minerals from beneath plaintiff's land by means of injection and production wells on surrounding corporation owned property. The trial court dismissed the complaint on the grounds that the common law rule of capture precluded relief. That rule, as interpreted by the Arkansas Supreme Court, holds that the drainage of valuable minerals from beneath a tract does not consistute a cause of action. The Court of Appeals reversed the trial court's decision, finding that the Arkansas interpretation of the capture rule did not encompass a situation when minerals beneath adjoining land were forced to migrate by means of injection wells located on another's property. The court then reviewed applicable state law to determine how the Arkansas Supreme Court would probably interpret the capture rule under these facts. It found that the capture rule would be applicable only where the drainage or seepage of valuable minerals was a natural result of the tapping of a common reservoir, not when it was the result of artificially induced movement. Therefore, since defendents had unlawfully interfered with plaintiff's vested property right, the case was remanded to the trial court to determine appropriate relief. (Hoffman-Florida)
W76-04472

CONSERVATION COUNCIL V COSTANZO (DEVELOPER'S FILLING ACTIVITY OF WETLANDS A VIOLATION OF FEDERAL WATER POLLUTION CONTROL ACT).
398 F Supp. 653-76 (ED NC 1975). 24 p.

Descriptors: *Federal Water Pollution Control Act, *North Carolina, *Marinas, *Dredging, *Environmental effects, Coastal structures, Recreation facilities, Permits, Construction, Judicial decisions, Pollutants, Legal aspects, Public rights, Land tenure, Navigable waters, Water quality control.
Identifiers: *Environmental impact statement.

Defendant developer had undertaken a dredging project of his plan to construct a marina on Bald Head Island. As a result of the dredging, plaintiff environmental groups brought this action seeking permanent injunctive relief. Plaintiffs also sought to have the court require: the restoration of the dredging area to its natural condition; a reprocessing of the dredging permit in accordance with National Environmental Policy Act (NEPA) standards; and the filing of a permit application by the developer for the deposit of pollutants into waters of the United States. The U.S. District Court, for the Eastern District of North Carolina, refused to grant immediate injunctive relief holding that to do so would adversely affect the public interest. Instead, the court ordered the Army Corps of Engineers to prepare and file an environmental impact statement (EIS) in accordance with NEPA regulations. If upon the issuance of the EIS it is found that the marina will have unacceptable adverse effects on the environment, appropriate injunctive relief could then be granted. However, because the developer's filling activities violated the discharge requirements of the Federal Water Pollution Control Act, the court did order the developer to immediately apply for the appropriate permit authorizing its discharge activities. (Hoffman-Florida)

W76-04473

FLOOD CONTROL PROJECTS AND DROUGHT EMERGENCIES.
Utah Code Ann, Sec 17-8-1 through 17-8-7 (1973), 6 p.

Descriptors: *Utah, *Flood control, *Droughts, *Flood plains, Construction, Floodwater, Basins, Streams, Flood damage, Easements, Right-of-way, Bridges, Storm water, Eminent domain, Pollution abatement, Canals, Lakes, Taxes, Real property, Appropriation, Precipitation(Atmospheric), Rivers.
Identifiers: *Flood channels, Obstructions, Natural channels.

This section of the Utah Code enumerates the powers of county commissioners in flood and drought relief projects. A board of county commissioners may contract with the United States for the construction of any flood control project designed to abate or control flood waters within the county. A board may also contract to maintain such flood control projects and may acquire easements and rights of way to relocate public roads or bridges if necessary. The state engineer shall have the duty of distributing the waters of flood control project and operating it at the expense of the county involved. Two or more counties may enter such a project jointly. A board of county commissioners may remove any obstacle from any natural channels within the county and may provide for and construct new channels to carry away flood waters. If necessary, the board may obtain easements and rights of way by right of eminent domain. It may also provide for the protection and use of flood channels and present flood plains within the county. Finally a board may, at any meeting, declare that an emergency drought exists in the county, and appropriate relief funds. (Segall-Florida)
W76-04474

CALVARES I V. BRANNAN SAND AND GRAVEL COMPANY (UPSTREAM PROPERTY OWNER'S POSSESSION OF NATURAL DRAINAGE EASEMENT OVER DOWNSTREAM PROPERTY).
534 P2d, 652-56 (Colorado Court of Appeals, 1975), 5 p.

Descriptors: *Colorado, *Drains, *Drainage, *Obstruction to flow, *Adjacent land owners, Flow, Rural areas, Easements, Channels, Construction, Repairing, Maintenance, Surface waters, Subsurface waters, Gravels, Percolating water, Civil law, Culverts, Depression beaches, Lakes, Recreation facilities, Shores, Excavation.

Plaintiffs, owners of higher land, brought action against defendant, owner of lower land, to enjoin defendant from obstructing the natural flow of water from the higher land onto the lower. The district court granted injunctive relief and required defendant to provide and maintain a drain. Defendant agreed that plaintiff's land was the dominant tenement and that his lower land was the servient tenement with respect to surface drainage, but contended that the rule granting a natural easement over downstream land for drainage of water applied only in rural areas where the land existed in its natural undisturbed state. The Colorado Court of Appeals held that the rule applied to urban areas as well, and to areas where the land existed in an altered state. Therefore the injunction was upheld and defendant made responsible for initial clearance of the former channel or, if a new course were elected, for intial construction thereof. Plaintiffs, however, were deemed responsible for replacement, repair and maintenance of the channel, and received reasonable right of access for such purposes. (Segall-Florida)
W76-04476

GENERAL AGRICULTURE CORPORATION V. MOORE (REPEALED STATUTE'S EFFECT NIL ON PRIORITY IN APPROPRIATION OF WATER WHICH IS A CONSTITUTIONALLY VALUABLE RIGHT).
534 P2d, p 859-64 (Montana, 1975), 6 p.

Descriptors: *Montana, *Surplus water, *Water rights, *Prior appropriation, *Adjudication procedures, Appropriation, Priorities, Legislation, Distribution, Beneficial use, Ditches, Right-of-way, Drains, Canals, Aqueducts, Reservoirs, Regulation, Streams, Judicial decisions.

Plaintiff filed a petition seeking to appropriate surplus waters from an adjudicated stream. While the action was pending an act was passed by the Montana legislature which substituted a new procedure for the appropriation of water rights and repealed the section of the former act under which plaintiff has instituted its action. Plaintiff filed an amended complaint, but on motion by defendants, claimants to rights in the same water supply source in which plaintiffs were claiming, the district court dismissed the amended complaint on grounds that plaintiff's action was abated by repeal of the former act. The Montana Supreme Court, in reversing, hleld that plaintiff had an existing right to the use of water for a useful or beneficial purpose and that under the 1972 Constitution such right was recognized and confirmed. (Segall-Florida)
W76-04477

ADMINISTRATION OF THE FLOOD PLAIN REGULATIONS.
Nebraska Rules and Regulations for L B 893 (1967), 3 p.

Descriptors: *Nebraska, *Floodways, *Structures, *Permits, *Flood plains, Floods, Jurisdiction, Encroachment, Agriculture, Livestock, Grazing, Recreation, Wells, Floodwater, Bridges, Railroads, Pipelines, Foundations, Hydrostatic pressures, Water table, Floodproofing, Sewage, Stormwater, Maintenance, Construction, Application methods, Investigations.
Identifiers: Fences, Alterations, Obstructions, Drainway.

These Nebraska Rules and Regulations deal with the administration of flood plains. They provide that the program initiated by the Commission for the delineation of Commission floodways shall follow a priority list of areas to be studied and establish the order in which studies shall be made. Within the limits of the Commission Floodway, the Commission shall delineat 'Selected Floodways'. The limits of a Selected Floodway shall be where the extent of permitted encroachment would not raise the estimated level of the flood of 100 year frequency in excess of one foot. Only the uses specified in these Regulations are permitted within Selected Floodways; and regulations are also set forth for the use of lands lying outside the Selected Floodways but within the Commission Floodway. Plans for the location, alteration or construction of any artificial obstruction in the Commission Floodway shall be submitted to the Commission for review and action. An applicant who has been denied a permit by the Commission may apply for a formal hearing. Also set forth are rules governing written requests for investigation of obstructions. (Segall-Florida)
W76-04478

HANAHULI ASSOCIATION, LTD (HIGHWATER SEASHORE MARK).
532 P2d 397-98 (Ha 1975), 2 p.

Descriptors: *High water mark, *Hawaii, *Boundaries(Property), *Shores, *Waves(Water), Seashores, Judicial decisions, Boundary disputes, Legal aspects, Classification, Pacific Ocean.

Corporation applied to register title to real property and the land court ruled that the relevant seaward boundaries of appellee's land were located at the intersection of the shore and the upper reaches of the wash of the waves. On appeal, the Supreme Court of Hawaii affirmed, holding that the phrase 'highwater mark at seashore' has been properly construed to mean the upper reaches of the wash of the waves. (Segall-Florida)
W76-04479

MEHL V. PEOPLE EX. REL. DEPT. OF PUB. WORKS (DAMAGES CAUSED BY INCREASED DRAINAGE DUE TO FREEWAY CONSTRUCTION).
532 P2d 489-95 (Cal 1975), 7 p.

Descriptors: *Highway effects, *California, *Easements, *Drainage, *Drainage systems, Culverts, Damages, Construction, Rain, Right-of-way, Industries, Investment, Storm drains, Ditches, Discharge(Water), Landscaping, Maintenance, State government, Judicial decisions.

Plaintiff County brought action against defendant landowners to determine the amount of compensation due for a drainage easement. The landowners cross-complained against the State for inverse condemnation for partial loss of their property resulting from the State's construction of a highway which had increased drainage across their property. The Trial court entered judgement for the landowners on their cross complaint and the State appealed, contending that the landowners were estopped from claiming damages because their predecessors in interest had waived any right to claim damages when they granted the state adjacent property for highway construction. Furthermore, the landowners had failed to file their claim within the statutory period of limitations. The Supreme Court of California held that the landowners' predecessors in interest had not known of the State's intention to build the drainage system and, therefore, had not intended to waive the claim asserted now by the successors. The Court also found that the claim was timely made because the limitation period did not begin to run until the landowners became aware of the drainage flow. In addition, the evidence supported a finding of taking of property by the State. The judgement as to damages, however, was reversed and remanded for a new trial. (Segall-Florida)
W76-04480

SHAUB V. DIST. CT. (DETERMINATION OF WATER RIGHTS TO MAINSTREAM INCLUDING RIGHTS TO ALL OF ITS SOURCES).
539 P2d 277-80 (Idaho 1975). 4 p.

Descriptors: *Idaho, *Water rights, *Tributaries, Streams, Jurisdictions, Ditches, Diversion, Beneficial use, Irrigation, Seepage, Trespass, Springs, Appropriation, Canals, Adjacent land owners.

Plaintiff brought action for a writ of review of an adjudication that he was in contempt of court for violation of a previously issued injunction. That injunction had ordered plaintiff to refrain from diverting more than ten miner's inches of water from a main stream known as the 'Mendini Tunnel'. In the original adjudication, the owner of a large ranch adjacent to plaintiff's ranch claimed that a seepage stream which formerly flowed into the main stream had been diverted by plaintiff for his own use. Plaintiff admitted using the water but asserted that it had always flowed into his ditch and was not part of the main stream. The district court found that the seepage stream was a natural tributary of the main stream; hence, when defendant diverted the water from its natural flow he was guilty of trespass. On petition for review, the Supreme Court of Idaho held that an adjudication of water rights to a main stream also adjudicated rights to all tributary streams; furthermore, the waste water made available to defendant in the

original decree was the flowage of two springs separate from the disputed stream at issue. The judgement of the district court was affirmed. (Segall-Florida)
W76-04481

CENTRAL COLORADO WATER CONSERVANCY DISTRICT V DENVER (RELATION BACK TO VALID 'FIRST STEP' (INTENTION) IN WATER APPROPRIATION TO MEASURE PRIORITY).
539 P2d 1270-73 (Colo. 1975). 4 p.

Descriptors: *Colorado; *Water storage, *Water rights, *Judicial decisions, *Appropriation, Water districts, Maps, Reclamation, Beneficial use, Diversion, Reservoirs, Water supply, Application methods, Investigations, Water, Priorities, Water allocation(Policy).

Plaintiff water conservancy district filed applications for conditional decrees as to water storage rights. The district court held for the objectors, City and County of Denver and Public Service Company of Colorado. The district contended that the filing of maps and statements alone was sufficient to warrant the granting of a conditional water decree, and that even if the filings alone did not suffice, the record showed that the district had taken the required 'first step' necessary for appropriating water. The Colorado Supreme Court first defined an appropriation as 'the intent to take accompanied by some open, physical demonstration of the intent, and for some valuable use', and then held that the filing alone was not sufficient to establish the first step since the district had not revealed its intention through an open demonstration on the land. Furthermore, the record did not show that the district had done anything sufficient to provide outsiders with notice of an intention to appropriate water and convert it to beneficial use. Therefore, the district court's judgement was affirmed. (Segall-Florida)
W76-04482

NEBOSHONE ASS'N, INC. V. STATE TAX COMMISSION (RIPARIAN OWNERSHIP INCLUSIVE OF SOIL UNDER WATER BUT NOT WATER OR FISH THEREIN).
227 NW 2d., 358-69 (Michigan Ct. App. 1975). 12 p, 1 tab.

Descriptors: *Assessments, *Property values, *Access routes, *Michigan, *Taxes, Riparian land, Navigable rivers, Appraisals, Value, Legal aspects, Judicial decisions, Government finance, Riparian rights, Water rights, Real property, Economics, Fishing, Recreation.

Plaintiff landowners appealed a determination of the State Tax Commission which greatly increased the assessed valuation of plaintiff's land. The land in question, which was in a wooded, unpopulated area, had a navigable river that ran through the middle of it. Because of the river, the Commission in assessing the property, placed a valuation on the river frontage. Plaintiffs objected, contending the Commission's action was unjustified since the river was owned and used by the public. The court agreed that riparian owners do not own the water or the fish in the water. The court went on to find, however, that the public's rights did not prevent plaintiffs from having unlimited access to the water. Thus, since plaintiffs were free to fish and use the water, the Tax Commission was justified in placing valuation on the river frontage in assessing the land.
W76-04483

SAMBS V. BROOKFIELD (PROPER WATER DRAINAGE FROM BRIDGE REQUIREMENT TO PREVENT ICE COLLECTION).
224 NW 2d, 582-93 (Wisc 1975). 12 p.

Descriptors: *Wisconsin, *Negligence, *Accidents, *Highway icing, Drainage engineering, Judicial decisions, Legal review, Drainage water, Backwater, Surface water, Excess water, Freezing, Ice, Roads, Penalties(Legal), City planning, Natural flow, Legal aspects, Drainage effects, Hazards, Safety, Risks.

Plaintiff automobile passenger brought this suit against defendant city for damages for injuries arising out of an automobile accident that was allegedly caused by the city's failure to provide adequate drainage culverts along the highway. The plaintiff contended that this inadequate drainage caused water to backup on the highway where it froze; and that the resulting accumulation of ice helped cause the accident. From a decision by the trail court that the city was 30% responsible for plaintiff's injuries, the city appealed. The city contended that the accumulation of ice was a 'natural' event, and that under a state statute, the city could not be found negligent unless the ice accumulation had existed for three weeks. The city also contended that the accident was caused by the driver's negligence, and not by the ice accumulation. The Wisconsin Supreme Court affirmed, however, finding that since the city was aware that the highway had improper drainage, any water that backed up as a result of the inadequate drainage was an 'artificial' event. The Court also found that sufficient evidence had been presented to support the trail court's finding as to the city's culpability. (Hoffman-Florida)
W76-04484

STATE DEPARTMENT OF NATURAL RESOURCES V. PANKRATZ (DETERMINATION OF RIGHT TO SAND BAR OFF ISLAND IN NAVIGABLE STREAM CONTROLLED BY HIGH WATER MARK BOUNDARY).
538 P2d, 984-94 (Alas 1975). 11 p.

Descriptors: *Alaska, *Federal-state water rights conflicts, *Accretion, *Gravels, *High water mark, Boundaries(Property), Ownership of beds, Federal jurisdiction, Land tenure, Legal aspects, Judicial decisions, Legal review, Riparian land, Dredging, Excavation, Islands, Contracts, Banks, Patents.
Identifiers: *Vegetation test(High water mark), Gravel bars.

Defendant landowner obtained title to an island that was situated directly in front of his riverfront property. Soon afterward the State of Alaska contracted with defendant for defendant to remove gravel clogging one channel of the river. Due to defendant's gravel bailing operation, a gravel bar began to emerge contiguous to the upstream end of defendant's island. Subsequently the State sought to acquire title to the gravel bar by means of an action to quiet title. After the trail court found in favor of the defendant, the State appealed to the Alaska Supreme Court. The State contended that the gravel bar had not emerged above the annual mean high water mark, and that even if it had, it was the result of the defendant's own actions, and not the result of natural accretion. As to the high water mark, the Court found that federal law was controlling, since title to the island stemmed from a federal patent. In this case, the Court found that the 'vegetation test' was applicable in determining the high water mark, and that defendant had satisfied this test by the use of expert testimony. As to the accretion issue, the Court found that no evidence had been introduced showing that the accretion had occurred as a result of improper bailing of gravel by the defendant. The trial court's decision was affirmed. (Hoffman-Florida)
W76-04485

STATE V. MICHELS PIPELINE CONSTRUCTION (NO LIABILITY FOR GROUND WATER USE FOR BENEFICIAL PURPOSE EVEN IF IT INTERFERES WITH ANOTHER'S USE UNLESS UNREASONABLE HARM IS INVOLVED).
217 NW 2d 339-51 (Wisc. 1974). 13 p.

Descriptors: *Water table, *Wisconsin, *Groundwater, *Percolating water, *Reasonable use, Subsurface waters, Water law, Legal aspects, Water rights, Competing uses, Water transfer, Sewers, Judicial decision, Legal review, Common law, Relative rights, Excess water(Soils), Groundwater resources, Saturated soils.
Identifiers: *Correlative rights.

In order to install a sewer line, defendant construction company had to remove water from the soil so that a sufficient depth could be obtained. Because of this dewatering of the soil, plaintiff State sough injunctive relief, alleging that the ground water table had been seriously reduced, causing hardship and damage to neighboring land and well owners. After the trial court dismissed the complaint for failure to state a cause of action, plaintiff appealed to the Wisconsin Supreme Court. The Court agreed with the trial court that previously controlling case law held that interference with ground water did not constitute a cause of action. The Court noted, however, that this common law rule has been severely criticized, and that two other rules have developed concerning rights in percolating waters. These rules are: (1) the reasonable use rule, which recognizes any unreasonable interference with ground water as a cause of action; and (2) the correlative right rule, which holds that a landowner cannot extract more than his share of the water. The Court rejected all three rules, however, adopting the Restatement of Torts rule which is a mixture of the reasonable use and correlative rights rules. The trial court decision was then reversed and remanded to determine if the defendant's actions constituted a cause of action under the Restatement rule. (Hoffman-Florida)
W76-04486

OMERNICK V. STATE (LEGISLATIVE ENACTMENTS AS PROTECTIVE OF PUBLIC RIGHTS IN WATER).
218 NW 2d, p. 734-44 (Wisconsin, 1974). 11 p.

Descriptors: *Judicial decisions, *Wisconsin, *Legislation, *Diversion, *Water rights, Alteration of flow, Water management(Applied), Water utilization, Irrigation water, Industrial water, Legal review, Legal aspects, Constitutional law, Navigable waters, Non-navigable waters, Streams, Water users, Water demand, State governments.
Identifiers: Statutory construction, Equal protection.

Defendant property owner had been convicted of statutory violations for diverting water without a permit from a neighboring stream to an irrigation pit on his own land. On appeal, defendant contended: (1) that the statute was not applicable to nonnavigable streams; (2) that the statute was applicable only to stream-to-stream diversions; (3) that the statute was not intended to cover surplus water; and (4) that the statute denied the defendant equal protection. The Wisconsin Supreme Court affirmed the decision, rejecting all of defendant's contentions. The Court found that the statute should be so constructed as to achieve the legislative intent. Thus, even though the statute referred to navigable streams, the general purpose of the statute made it clear that the statute was applicable to all streams. The Court also found that a proper interpretation of the statute negated the defendant's second and third contentions. As to equal protection, the Court found that a valid basis existed for requiring a permit to divert water for irrigation purposes, even though no permit was required for industrial uses. (Hoffman-Florida)
W76-04487

TAMULION V. STATE WATERWAYS COMMISSION (DAMAGES CAUSED BY EROSION FROM SMALL CRAFT HARBOR CONSTRUCTION RENDERING COMMISSION LIABLE).
212 NW2d, p. 828-33 (Michigan Court of Appeals, 1973). 6 p.

Descriptors: *Michigan, *Beach erosion, *Shore protection, *Land use, Navigable waters, Land management, Judicial decisions, Legal review, Harbors, Coastal engineering, Legal aspects, Eminent domain, Non-structural alternatives, Riparian land, Riparian rights, Water law, Water policy, Penalties(Legal), Property values, Real property, Contracts.
Identifiers: *Navigational servitude doctrine.

At the request of defendant waterways commission, plaintiff property owners gave permission to the state to enter their property for the purpose of taking remedial action to prevent further erosion of shoreline property caused by the construction of a small craft harbor. Plaintiffs brought this action for damages when they discovered that the state's remedial action consisted of dumping tons of jagged rocks along the entire stretch of the shoreline. Plaintiffs contended that the property value of the land had been substantially reduced since access to the water had been made virtually impossible. The trial court dismissed the complaint, however, finding that the written permission given by plaintiffs precluded any recovery. The Court of Appeals reversed, finding that plaintiffs did not give permission for the extensive operations that were actually undertaken. The court went on to find that the navigational servitude doctrine, which would recognize no compensation rights in riparian or littoral property owners where the government is involved, was not applicable in this case since shore land had actually been taken to improve navigation. (Hoffman-Florida)
W76-04488

TOBIN V. FORD (NO TAKING OF RIPARIAN RIGHTS).
371 NYS 2d, p. 721-24 (Supreme Court, 1975). 4 p.

Descriptors: *New York, *Condemnation, *Real property, Mapping, *Appraisals, Eminent domain, Judicial decisions, Legal aspects, Riparian land, Condemnation value, Constitutional law, Reservoirs, Value, Legal review, State jurisdiction, Water supply, Administrative agency.
Identifiers: *Procedural requirements.

New York City had mapped riparian property situated up to seventy miles below the Pepacton Reservoir. This mapping was done so that a fair appraisal price could be determined concerning compensation in a condemnation suit that had been initiated by the city. Petitioner landowner, who owned land located ninety-five miles below the reservoir, brought action seeking a judgement ordering the appellant water supply board to map his riparian premises. Petitioner contended that the city's actions constituted a compensable taking of his property. Appellants moved to dismiss the complaint, contending that the trial court did not have the authority to order the board to condemn petitioner's property. The court rejected this contention, however, and granted the requested relief. On appeal, the Supreme Court remanded the case, finding that the trial court had decided the case on the merits before it had given appellant a chance to answer the petition. Although the trial court did have jurisdiction, appellant should have been given leave to answer. (Hoffman-Florida)
W76-04489

PEOPLE V. ABRAMS (NAVIGATION LAW INAPPLICABLE TO TIDEWATERS).
372 NYS 2d., 138-41 (1st D.C. 1975). 4 p.

Descriptors: *Boundary disputes, *New York, *Tidal waters, *Navigable waters, *Tides, Legal aspects, Bodies of water, Boats, Navigation, Water law, Regulation, Jurisdiction, State jurisdiction, Legislation, Governments, Water rights, Local governments, Judicial decisions.

Plaintiff state sought to charge defendant with violation of Navigation Law s. 164 which prohibits defacing or removing of identification or serial numbers on outboard motors. Defendant was arrested on the tidewaters bordering and lying within the boundary of Suffolk County. Defendant claimed that the Navigation Act did not apply to such tidewaters while plaintiff claimed such tidewaters were not exempt from the application of the Navigation Act. The District Court of Suffolk County dismissed the action upon defendant's motion, holding that the Navigation Law did not apply to tidewaters bordering on or lying within the boundaries of Nassau and Suffolk counties. (Welch-Florida)
W76-04490

NEW YORK CITY HOUSING AUTHORITY V. COMMISSIONER OF ENVIRONMENTAL CONSERVATION DEPARTMENT (MORATORIUM CLAUSE OF TIDAL WETLANDS ACT).
372 NYS 2d, p 146-52 (Supreme Court, 1975). 7 p.

Descriptors: *Land use, *Wetlands, *Legislation, *New York, *Eminent domain, Permits, Appropriation, Real property, Compensation, Zoning, Natural resources, Drainage, Land management, Properties, State governments, Regulation.
Identifiers: *Tidal wetlands.

The New York City Housing Authority brought suit attacking the applicability of the Tidal Wetlands Act to land acquired by the city under power of eminent domain. It also contended the Act was unconstitutional, thus challenging the power of the state environmental commissioner to prohibit alterations of tidal wetlands. The Supreme Court of Queens County treated the suit as one for declaratory judgment. It held that: (1) the housing authority was a separate entity, distinct from the state; (2) that land acquired by the city under the power of eminent domain was not exempt from the Act; (3) that the legislature had a valid purpose in formulating a comprehensive system of land use regulations for preservation of the wetlands; and (4) that a moratorium on alterations in effect for less than two years was not unreasonable. Thus the commissioner's actions under the Act's moratorium clause did not amount to an unconstitutional taking of property without just compensation. (Segall-Florida)
W76-04491

FORDHAM OPERATING CORP. V. WESTCHESTER COUNTY (DOMINANA EASEMENT FOR DRAINAGE OF SURFACE WATER NOT INCLUSIVE OF ARTIFICIAL CONCENTRATION OF WATER THAT WOULD HAVE DRAINED ELSEWHERE).
370 NYS 2d., 977-896 (Sup. Ct. 1975). 10 p.

Descriptors: *Easements, *New York, *Drainage systems, *Drainage water, *Surface drainage, Surface waters, Drainage practices, Excess water(Soils), Drainage, Water distribution(Applied), Pipes, Legal aspects, Adverse possession, Drainage engineering, Channeling, Damages, Controlled drainage, Surface runoff.

Plaintiff landowner brought action for monetary damages and to enjoin defendant defendant county from continuing to collect and discharge channeled water onto plaintiff's property. Plaintiff's predecessors in title had conveyed a 40 ft.-wide easement across the property to the city of Rye. The city subsequently installed a sewer line. The bed of the easement was transferred to the defendant who constructed a road and a catch basin with drain pipe. At trial, both parties moved for summary judgement, but the Supreme Court of Westchester County held that genuine issues of material fact existed as to whether the defendant had been given permission by the city of Rye to install a drainage pipe and head wall upon the easement, and whether such use of the drainage pipe was so open and notorious as to have put plaintiff on notice as to the presence of an easement. The court further held that one who claims a dominant estate by reason of an easement permitting natural drainage of surface water to the servient estate cannot by artificial means concentrate and discharge surface waters which, if left alone, would drain elsewhere.
W76-04492

MAY V. TORRES (ADJOINING RANCH OWNERS' RIGHTS TO FLOW OF WATER IN A DRAW).
519 P2d 298-300 (NM, 1974). 3 p.

Descriptors: *Beneficial use, *Natural streams, *Permits, *Diversion, *Unappropriated water, Appropriation, Damages, *New Mexico, Surface waters, Grazing, Jurisdiction, Watercourses(Legal aspects), Water permits, State governments, Irrigation, Water rights, Costs, Drainage effects.
Identifiers: Draws, Injunctive relief.

Plaintiff rancher brought suit against defendant neighboring rancher seeking a determination of the respective rights of each to the flow of water in a draw which drained through a portion of defendant's ranch and onto plaintiff's ranch. Plaintiff also asked for an injunction commanding defendant to refrain from diverting more than his share of water from the draw, and damages for losses incurred from defendant's alleged unlawful diversion of water. Both plaintiff and defendant claimed to have made beneficial use of waters flowing down the draw for grazing purposes. The district court dismissed the case because neither party had secured a state permit to use the waters. The Supreme Court of New Mexico, however, found that if this draw does constitute a natural stream, and if there are unappropriated waters therein of which the parties have been making beneficial use, then they are entitled to have their respective rights adjudicated, even though the adjudication would not affect the rights of the State in these waters. The cause was remanded for trial on the issues. (Segall-Florida)
W76-04493

IN RE WATER RIGHTS OF FT. LYON CANAL CO. (CONTRACT RENDERS PRIORITY TO WATERS INFERIOR TO ANOTHER).
519 P2d 954-57 (Colo. 1974). 4 p.

Descriptors: *Water rights, *Priorities, *Jurisdiction, *Reservoirs, *Lakes, Licenses, Irrigation, Contracts, Spring waters, Colorado, Pumping, Prescriptive rights, Construction, Legislation, Appropriation, State jurisdiction.
Identifiers: Non-tributory water, Priority decrees, Water judge.

In 1954 appellee, a canal company owning land upon which a lake is located, entered into an agreement with appellants whereby appellants were granted a license to lay pipes and to pump water from the lake to their land for irrigation purposes. In 1959 appellants obtained a decree allowing the withdrawal of five cubic feet of water per second. Subsequently, the canal company applied for a conditional water right in the lake amounting to twenty-five cubic feet per second. Appellants appeared and asked that any rights granted the company be subject to appellants' decree. The court found it had jurisdiction, granted the conditional decree, and ruled that appellants' prior decree was junior to the water right granted the canal company. On appeal appellants contended that a water judge does not have jurisdiction over non-tributory water, and that priorities awarded in any year are junior to those awarded in previous years. Furthermore, they claimed the original agreement was invalid because appellee was not

owner of the water. The court rejected all of appellants' contentions and affirmed the decree. (Segall-Florida)
W76-04494

WILBER DEVELOPMENT CORPORATION V. LES ROWLAND CONSTR., INC. (SUBDIVISION STORM DRAINAGE FACILITIES MAY INCREASE FLOW OF SURFACE WATER IF NO DAMAGE CAUSED FROM WATER COURSE CHANGE).
423 P2d. 186-90 (Wash. 1974).

Descriptors: *Natural flow, *Storm structure, *Washington, *Judicial divisions, *Drainage water, Legal aspects, Water law, State governments, Local governments, Penalties(Legal), Surface waters, Surface drainage, Drainage systems, Water control, Channels, Construction, Land development.

Plaintiff corporate landowner brought an inverse condemnation action against defendant municipality and a land development company for damage allegedly caused to plaintiff's land by a storm drainage facility constructed by defendants. Plaintiff contended that the storm drainage facility discharged more water onto its land than would have naturally reached it, with resulting damages. Defendants, however, argued that no new sources of water had been diverted and that the water table under plaintiff's land remained the same as before the facility was constructed. The Washington Supreme Court held that a municipality is ordinarily not liable for consequential damages caused by increased surface water flow if the damages arise wholly from changes in the character of the surface produced in the ordinary and regular course of municipal expansion. Plaintiff could recover damages only if it could show that municipality had collected surface water by an artificial channel and discharged it onto plaintiff's land. (Nursey-Florida)
W76-04495

GROFF V. CIRCLE K CORP. (WATER DAMAGE RESULTING FROM GRADE CHANGE BY ADJOINING LAND OWNER).
525 P2d 891-93 (NM Ct. App. 1974). 3 p.

Descriptors: *Artificial water courses, *New Mexico, *Judicial decisions, *Adjacent landowners, *Drainage water, Legal aspects, Water law, State governments, Penalties(Legal), Natural flow, Drainage effects, Construction, Land development, Drainage systems, Surface waters, Surface drainage, Paving, Water control, Channels.
Identifiers: *Artificial channels.

Plaintiffs landowners brought an action against defendant corporation for damage caused by surface water discharge onto their property. Plaintiffs contended that defendant's construction of a store and parking lot diverted onto their property drainage which naturally flowed away from it. The New Mexico Court of Appeals held that, although defendant had not used drainage systems to rechannel the water, the manner in which the corporation changed the grade of the land and paved the parking lot created an 'artificial channel' which discharged water onto plaintiff's land. The Court then found defendant responsible for damage caused by this redirected drainage water. (Nursey-Florida)
W76-04496

HOWARD V. CACTUS HILL RANCH CO. (UPSTREAM OWNER'S POSSESSION OF NATURAL EASEMENT ON LAND DOWNSTREAM FOR SURFACE WATER DRAINAGE).
529 P2d 660-62, (Colo. Ct. App. 1974). 3 p.

Descriptors: *Colorado, *Judicial decisions, *Natural flow doctrine, *Drainage water, Classification, Legal aspects, Water law, Common law, State governments, Adjacent land owners, Right-of-way, Easements, Controlled drainage, Drainage systems, Surface drainage, Ditches, Surface waters, Drainage effects.
Identifiers: *Nuisance.

Plaintiff downstream property owner brought on action for trespass and nuisance against defendant upstream property owner. Plaintiff contended that defendant had trespassed and created a nuisance by his use of an irrigation ditch along a right-of-way strip on the boundary of plaintiff's land. Defendant, however, argued that the water discharged from the ditch onto plaintiff's property was consistent with the natural and historic drainage of water from the upper land onto the lower land and thus was discharged pursuant to a lawful easement. The Colorado Court of Appeals found the drainage through the right-of-way to be a natural flow. Since plaintiff failed to prove that defendant had made any detrimental change in the natural flow, defendant's discharge of water onto plaintiff's land was presumed pursuant to the natural easement held by upper landowners over lower lands. (Nursey-Florida)
W76-04497

STATE V. YELSEN LAND CO., INC. (STATE PRESUMPTIVE OWNER OF TIDELANDS WITHOUT SPECIFIC INTENT SHOWN TO CONVEY LANDS BELOW USUAL HIGH WATER MARK).
216 SE 2d 876-79 (SC 9175). 4 p.

Descriptors: *Boundaries(Property), *South Carolina, *Judicial decisons, *Ownership of beds, *Boundary disputes, Legal aspects, Water law, State governments, Common law, Navigable waters, Accretion(Legal aspects), Shores, High water mark, Water levels, Tidal waters, Tides.
Identifiers: Coastal waters.

Plaintiff State of South Carolina brought an action against defendants, a land company and a realty company, to determine title to tidelands. Defendants contended that the land grant to their predecessors in title describing the boundary of the property as 'bounded to the North by a small inlet' and to the West 'by a sound or Creek' gave them title to the tidelands. The State claimed the boundary of defendants' property to be defined by the high water mark. After a judgement for the State in the Court of Common Pleas, the South Carolina Supreme Court held that, in the absence of specific language to the contrary, the grant conveyed property to the high water mark only. The State's ownership of disputed tidelands below that mark was affirmed. (Nursey-Florida)
W76-04498

STATE V. GRIFFITH (NECESSARY TO SHOW SPECIFIC INTENT TO CONVEY ANY LAND BELOW USUAL HIGH WATER MARK OF STREAM IN ORDER TO CONVEY TITLE TO ADJACENT TIDELANDS).
216 SE 2d 765-67 (SC. 1975). 3 p.

Descriptors: *High water mark, *South Carolina, *Judicial decisons, *Boundary disputes, *Ownership of lands, Legal aspects, State governments, Water law, Navigable waters, Streams, Comon law, Accretion(Legal aspects), Shores, Water levels, Tides, Tidal waters, Boundaries(Property).

Plaintiff State of South Carolina brought an action against defendant landowner to determine title to certain tidelands. Plaintiff contended that the tidelands were conveyed to his predecessors in title by a grant describing the northerly boundary of the property as a 'Deep Creek', which was ascertained to be a tidal, navigable stream. The State claimed title to all lands below the high water mark. The South Carolina Supreme Court held that, in the absence of any language in the grant signifying a specific intent to convey title to the tidelands, the general rule that land below the high water mark of a navigable stream belongs to the state would apply. (Nursey-Florida)
W76-04499

METROPOLITAN SANITARY DISTRICT V. UNITED STATES STEEL CORPORATION (ABATEMENT OF WATER POLLUTION OF LAKE MICHIGAN).
332 NE2d 426-39 (Ill. Ct. App. 1975). 14 p.

Descriptors: *Governmental interrelations, *Illinois, *Judicial decisions, *Water pollution control, *State jurisdiction, Legal aspects, Water law, Federal government, Local government, Federal jurisdiction, Penalties(Legal), Permits, Regulations, Water pollution, Water pollution sources, Water quality, Water quality control, *Lake Michigan, Lakes, Industrial wastes.

Plaintiff metropolitan sanitary district brought an action to abate the pollution of a lake by defendant corporation. Defendant moved to dismiss or to stay any action pending completion of administrative proceedings before the Environmental Protection Agency (EPA). This motion was denied. On appeal the Illinois Appellate Court held that the doctrine of primary jurisdiction was not applicable since the hearings before the EPA concerned the granting of a permit which would allow defendant to continue polluting under certain restrictions, while the state court proceedings involved total abatement of the pollution. (Nursey-Florida)
W76-04500

6F. Nonstructural Alternatives

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, NORTHWEST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environmental.
For primary bibliographic entry see Field 7C.
W76-04157

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, SOUTHEAST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environment.
For primary bibliographic entry see Field 7C.
W76-04158

FLOOD DAMAGE IN FREDERICTION.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 7C.
W76-04260

ANALYSIS AND SYNTHESIS OF FLOOD CONTROL MEASURES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-04308

THE FEDERAL RULE OF ACCRETION AND CALIFORNIA COASTAL PROTECTION,
For primary bibliographic entry see Field 6E.
W76-04338

SAMPLE FLOOD PLAIN ZONING ORDINANCE FOR LOCAL UNITS OF GOVERNMENT.
Minnesota Dept. of Natural Resources, St. Paul. League of Municipalities, Association of Cities.

Descriptors: *Minnesota, *Flood plain zoning, *Land use, *Land classification, *Non-structural alternatives, Regulation, Legal aspects, Water

zoning, Land management, Multipurpose projects, Floodways, Administration, Penalties(Legal), Decision making, Boundary disputes, Permits, Building codes, Legislation.

Minnesota has prepared a sample flood plain zoning ordinance that calls for local zoning agencies to divide flood plains into floodway and flood fringe areas, Generally, the only land uses that will be allowed in floodway zones will be those having a low flood damage potential, such as agriculture and parking areas, while flood fringe areas will not be so severely limited. This division should eliminate much of the arbitrary decision making that arises when proposed developments are evaluated on a case by case basis. This sample ordinance also describes how the local zoning map should be established, and lays down procedural guidelines to be used in interpreting boundary disputes. Typical permitted uses for floodway and flood fringe areas are also presented. To assure compliance with the ordinance, landowners must apply for a land use permit before they make any alterations or additions to their property. If the designated local agency is satisfied that the proposed changes are consistent with the ordinance's land use provisions, a certificate of compliance will be issued upon completion of specified procedural requirements. (Hoffman-Florida)
W76-04356

FLOOD PLAIN MANAGEMENT FOR OREGON CITIES AND COUNTIES.
Oregon Univ., Eugene. Bureau of Governmental Research and Service.
Oregon Water Resources Board, (Salem), (1971). 29 p, 2 fig, 2 map.

Descriptors: *Oregon, *Flood plain zoning, *Land use, *Flood plain insurance, *Non-structural alternatives, Flood protection, Flood damage, Land management, Water zoning, Flood ways, Legislation, Regulation, Reasonable use, Water law, Local governments, Economics, Property values, Permits.
Identifiers: *Flood protection programs, *National Flood Insurance Program.

To provide a suitable basis for flood plain management in Oregon cities and counties, all flood prone areas should be dlineated into floodway or floodway fringe districts. Because of their low elevation, floodway areas will generally be zoned for land uses having a low flood damage potential. Floodway fringe districts, on the other hand, will generally be zoned to allow building and other such structures. Care should be taken by local zoning agencies, however, to make sure that land uses are not unnecessarily restricted, since the courts have shown a tendency to invalidate zoning restrictions that deny all reasonable economic use of the land. Zoning agencies may nevertheless impose reasonable restrictions, and the agencies usually enforce such regulations by requiring individuals to obtain permits before they make any alterations or additions to their flood prone lands. Although land management programs can do much to reduce flood damage, a comprehensive flood protection program should also include adequate flood insurance. Recognizing this, the federal government established the National Flood Insurance Program in 1968. This insurance, which is available only to small business and one-to-four family dwellings, is aimed at providing subsidized insurance rates to present occupants of flood prone areas. To illustrate how an overall flood management program can be implemented, a sample zoning ordinance is presented. (Hoffman-Florida)
W76-04357

ORDINANCE TO AMEND THE BUILDING CODE OF THE CITY OF GILLETTE, WYOMING.
Gillette, Wyoming, City Council Ordinance 43-73 (1973). 2 p.

Descriptors: *Wyoming, *Building codes, *Flood control, *Construction, Flood plains, Legislation, Permits, Flood plain insurance, Maps, Water zoning, Water management(Applied), Water policy, Flood plain zoning, Design standards, Regulation, Administrative decisions, Adoption of practices.
Identifiers: *Flood management programs.

Ordinance 43-73 amends the building code of the City of Gillette, Wyoming, by adopting by reference, with specified exceptions, the 1975 Uniform Building Code. The ordinance also recognizes that county zoning and building permits are issued by the City-County Planning Office to areas around the city. While zoning regulations are in effect in these areas, there is no building code, and thus little control is exerted over construction techniques. This is of concern to the City of Gillette, since it wants to include these outer areas in the Flood Insurance Rate Map. Therefore, a County Subdivision Regulation is adopted here which will provide some control over construction in these outer flood plain areas. The regulation, which limits the uses which may be made on lands subject to flooding, is viewed as a temporary measure until flood plan management and building code ordinances are adopted. (Hoffman-Florida)
W76-04358

AN ORDINANCE RELATING TO FLOOD PLAIN MANAGEMENT.
Gillette, Wyoming, Ordinance Relating to Flood Plain Management (1975). 2 p.

Descriptors: *Legislation, *Flood protection, *Land use, *Flood plain zoning, *Flood plains, *Legal aspects, Penalties(Legal), Local government, Regulation, Permits, Water law, Flood damage building codes, Flood data, Floodways, Land resources, Water resources, Land development, Water resources development, Water utilization, Water management(Applied), Hazards, Public utilities, Construction, *Wyoming.

The City of Gillette, Wyoming has passed an ordinance relating to flood plain management, significant provisions of which include: (1) a direction to the City Engineer to prepare maps delineating the flood plains and floodways within the city; (2) a prohibition within the floodways of dumping, filling, residential uses, and confining of animals, and of all structures except navigational structures, public water facilities, bridges and utilities; (3) a requirement that all new construction within 'Flood Plain Areas Having Special Flood Hazards' be designed and use materials resistant to flood damage; and (4) a requirement that water and sewage systems be designed to eliminate or minimize infiltration of flood waters. Other sections of the ordinance provide specifically for public nuisances, permits, and penalties. (Nursey-Florida)
W76-04359

MINIMUM REQUIREMENTS FOR FLOOD CONTROL.
Charleston County, South Carolina, Ordinance 170 (1973). 6 p.

Descriptors: *South Carolina, *Legislation, *Flood control, *Flood protection, *Flood plain zoning, Legal aspects, Reglation, Water law, Land resources, Water resources, Land development, Water resources development, Building codes, Land use, Water utilization, Floods, Flood damage, Floodproofing, Floodways, Water management(Applied), Permits, Potable water.
Identifiers: *National Flood Insurance Program.

Representative provisions of this county ordinance dealing with land use in conformance with the National Flood Insurance Program include: (1) all residential construction shall position their finished first floor elevation in accordance with the prescribed elevations for the zone in which they are located; (2) all new construction of non-residential structures shall have the lowest floor elevated to or above the applicable level prescribed for their flood zone; (3) flood proofing of structures will include structural and non-structural engineering techniques which seal structures and keep them free from encroachment of flood water below the prescribed finished first floor elevation; (4) construction is restricted within the extra-hazardous ocean front zones; (5) new or replacement water and sewer systems will be designed, built and located so as to minimize infiltration of flood waters and to avoid impairment during flooding; and (6) all new construction and improvements in the flood zones will comply with the Southern Standard Building Code so as to provide approved anchoring to minimize the possibility of flood and velocity damage. This ordinance was to take effect on November 15, 1973. (Nursey-Florida)
W76-04360

FLOOD PLAIN MANAGEMENT -- FPM-1 AND FLOOD INSURANCE PROGRAM.
Indiana Dept. of Natural Resources, Indianapolis.
Information File prepared by Dept. of Nat. Res. (1974). 31 p, 2 photo, 1 fig.

Descriptors: *Administrative agencies, *Building codes, *Indiana, *Flood control, *Flood plain insurance, Flood plains, Legislation, State governments, Governmental interrelations, Management, Regulation, Water policy, Water management(Applied), Zoning, Non-structural alternatives, Comprehensive planning, Flood plain zoning.
Identifiers: *Flood management programs, *Federal Flood Insurance Program.

The Indiana Department of Natural Resources Water Division has made information available in packet form to aid Indiana planning agencies and zoning authorities in developing a comprehensive flood management program. Under the authority of the Flood Plain Management Act, the Indiana National Comission (NRC) has promulgated rules and regulations which can be used to aid local authorities in managing flood hazard areas within their jurisdiction. If these voluntary rules are adopted by communities across the state, it will provide a uniformity of policy necessary to the protection of Indiana's Flood Plains. The formation packet also contains copies of the Indiana 1945 Flood Control Act and the Indiana 1973 Flood Plain Management Act, as well as various rules promulgated by the NRC, a suggested program for flood plain management, and a copy of selected questions and answers concerning the Federal Flood Insurance Program . The importance of this Federal Flood Insurance Proplem has been substantially increased by the 1973 Flood Protection Act which requires that federally financed construction projects be adequately covered by flood insurance. (Hoffman-Florida)
W76-04361

MODEL FLOODWAY ORDINANCE (FLOODWAY REGULATION).
North Carolina General Assembly, Raleigh.
North Carolina, Model Floodway Ordinance (1971). 5 p.

Descriptors: *North Carolina, *Legislation, *Flood control, *Flood protection, *Construction, *Obstruction to flow, Legal aspects, Water law, Penalties(Legal), Local governments, Regulation, Floodways, Flood plain zoning, Floods, Flood damage, Land, Land use, Land resources, Land development, Water resources, Water resources development, Water management(Applied).

The North Carolina General Assembly has enacted a model floodway ordinance empowering local governments to establish floodways and to regulate obstructions in floodways. Representative provisions of the ordinance include: (1) no ar-

tificial obstruction may be placed in any floodway unless a permit has been granted for such artificial obstruction; (2) artificial obstructions already existing in a floodway are not in violation of this ordinance but may not be enlarged or replaced without a permit; (3) the determination to issue a permit for the placement, replacement or enlargement of an artificial obstruction on a floodway will be based on consideration of certain specified effects of the artificial obstruction in creating danger to life and property; and (4) any violation of this ordinance will constitute a misdemeanor. The purpose served by designating certain areas as floodways is to help control floods by preventing obstruction which inhibit flow and increase flood height and damage. (Nursey-Florida)
W76-04362

PROPOSED FLOOD DISTRICT ORDINANCE.
Galveston, Texas, City Council Proposed Amendment to Zoning Ordinance, Chapter 25 (1974). 13 p.

Descriptors: *Texas, *Legislation, *Flood protection, *Building codes, *Flood plain zoning, Legal aspects, Water law, Flood control, Floods, Flood damage, Flood plains, Floodways, Floodproofing, Land, Land use, Land development, Water management(Applied), Regulation, Construction, Local governments, Water supply, Sewage, Drainage systesems.

This proposed ordinance will create two new zoning classifications known as FP-1 and FP-2 to coincide with Flood Plain Area 1 and Flood Plain Area II on the official zoning district map. Representative provisions include: (1) all new construction in FP-1 shall be elevated to a grade not less than six inches above the base flood elevation; (2) all new construction in FP-2 shall have the lowest floor elevated at least six inches above the base flood elevation or eighteen inches above the natural ground, whichever is higher, and utility and sanitation facilities of non-residential structures shall be floodproofed to the same elevation; (3) all construction, improvements, repairs and developments shall conform to construction requirements prescribed by the ordinance; (4) new or replacement water supply systems shall be designed to eliminate infiltration of flood waters into the system; and (5) new or replacement sanitary sewer systems shall be designed to eliminate infiltration of flood waters into the system or discharges from the system into flood waters. The general purpose of this ordinance is to promote the public health and safety and to reduce losses of life and property caused by flooding. (Nursey-Florida)
W76-04363

FLOOD HAZARD REGULATIONS (AMENDMENT TO THE BUILDING CODE).
Galveston, Texas, City Council, Chapter 26, Section 26-3 (1974). 6 p.

Descriptors: *Texas, *Legislation, *Flood protection, *Flood plain zoning, *Building codes, Legal aspects, Water law, Construction, Floods, Flood control, Flood damage, Flood plains, Floodproofing, Land, Land use, Land resources, Land development, Regulation, Drainage systems, Water supply, Local governments, Water management(Applied).
Identifiers: *National Flood Insurance Program.

In order to entitle city residents to particulate in the benefits received under the National Flood Insurance Program, the City Council of Galveston, Texas, has adopted this ordinance, representative provisions of which include: (1) all new construction or substantial improvements of residential structures will have the lowest floor elevated at least to the level of the 100-year flood in zone A-11 of the special flood hazard area, and at least five feet above the 100-year level in zone V-II; (2) non-residential construction will have the lowest floot either elevated or floodproofed at least to the 100-year flood level in zone A-II and at least five feet above the 100-year flood level in zone V-II; (3) new construction or substantial improvements to existing structures in special flood hazard areas which are situated on ground the elevation of which is below the 100-year flood level will be elevated on anchored piles or columns to a lowest-floor level at or above the 100-year flood level; and (4) new or replacement water supply and sewer systems shall be designed to minimize the flow of flood waters into the systems and the flow of discharges into flood waters. The Planning Commission will review subdivision proposals to assure that they are consistent with the requirement minimize flood damage. (Nursey-Florida)
W76-04364

AN ORDINANCE REGULATING THE USE OF FLOOD PLAIN AREAS.
For primary bibliographic entry see Field 4A.
W76-04475

ADMINISTRATION OF THE FLOOD PLAIN REGULATIONS.
For primary bibliographic entry see Field 6E.
W76-04478

6G. Ecologic Impact Of Water Development

DEVELOPMENT PRIORITIES IN THE WEST RIVER REGION, NORTH DAKOTA, A SOCIAL ATTITUDE AND COMMUNICATION ANALYSIS,
North Dakota Univ., Grand Forks. Communication Research Center.
For primary bibliographic entry see Field 6B.
W76-04007

THE EFFECT OF THE GOSHEN BAY DIKE ON THE BENTHOS OF UTAH LAKE IN RELATION TO WATER QUALITY,
Brigham Young Univ., Provo, Utah. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W76-04013

AQUATIC SURVEY OF SELECTED STREAMS WITH CRITICAL HABITATS ON NATIONAL RESOURCES LANDS AFFECTED BY LIVESTOCK AND RECREATION,
Brigham Young Univ., Provo, Utah. Center for Health and Environmental Studies.
For primary bibliographic entry see Field 4C.
W76-04042

INDICATORS OF CHANGE IN THE RECREATION ENVIRONMENT: LAW AND ENVIRONMENTAL PLANNING,
Department of Justice, Washington, D.C. Land and Natural Resources Div.
W. M. Cohen.
Federal Bar J., Vol 33, p 283-295 (1974). 13 p, 49 ref.

Descriptors: *Federal government, *Comprehensive planning, *Recreation, *Environmental effects, *Administrative agencies, Administration, Management, Ecology, Environmental control, Judicial review, Decision making, Constitutional law, Recreation facilities, Social participation, Legal aspects, Coordination, Social aspects, Water law.
Identifiers: *National Environmental Policy Act(NEPA).

A large number of environmental protection statutes have been passed in recent years which require extensive planning. This paper explores the impact these statutes will have with special regard to recreation and recreational planning. The National Environmental Policy Act (NEPA) contains a highly publicized procedural mandate requiring the preparation of an environmental impact statement to accompany every report on proposals for legislation or other Federal actions significantly affecting the quality of the human environment. Highly developed recreation areas can put great stress on the environment and therefore require environmental safeguards. Set forth are suggested topics and format for an environmental impact statement on the development of such an area. The legal concept of standing is explored to show recent trends, including the expansion of what constitutes a litigable interest. This trend should allow increased public involvement in national, regional, and community planning. Also examined are some of the safeguards which guard against administrative arbitrariness. One such safeguard, judicial review, operates by requiring the trial record to show the rationale and basis for administrative decision so that the appellate court will know all the facts. (Hoffman-Florida)
W76-04328

THE PROTECTION OF THE ENVIRONMENT AND WORLD PUBLIC ORDER: SOME RECENT DEVELOPMENTS,
Yale Univ., New Haven, Conn. School of Law.
M. S. McDougal, and J. Schneider.
Mississippi Law Journal, Vol 45, p 1085-1124 (September, 1974). 40 p. 147 ref.

Descriptors: *Ecosystems, *United Nations, *Resource allocation, *Treaties, Conservation, United States, Administration, Coasts, Decision making, Organization, Education, Resources development, Natural resources, Oceans, Beds, Jurisdiction, Governments, Leadership, Ecology.
Identifiers: *International cooperation, International agreements.

This article examines world environmental policies and resource allocation in terms of inclusive and exclusive use. By inclusive the authors mean those environmental interests which are shared by all nations and which relate to the healthy functioning of the earth-space environment as a whole. By exclusive they mean those interests that every state has in promoting its own internal optimum order, and which often result in special claims on the environment which may or may not conflict with inclusive interests. The trend is toward greater demands for shifts from inclusive to exclusive competence. State claims to 'patrimonial seas' in which they assert the right to exercise exclusive competence over natural resource exploitation are illustrative. This trend must be reversed, suggest the authors. Future decisions about competence over resources should reflect as high a degree of inclusive enjoyment as possible, especially regarding the oceans and seabed. The United Nations in particular should encourage and initiate programs to change international attitudes towards resources that are inclusive by nature. (Parrish-Florida)
W76-04329

SYSTEMS DESCRIPTION OF THE U.S. COAST GUARD MARITIME ENVIRONMENTAL PROTECTION PROGRAM,
For primary bibliographic entry see Field 5G.
W76-04330

A SURVEY OF REMEDIES (TO WATER POLLUTION AND WATER SCARCITY PROBLEMS).
Stanford Environmental Law Society, Calif.
For primary bibliographic entry see Field 5G.
W76-04331

PRIVATE INFLUENCE ON ENVIRONMENTAL POLICY: THE CASE OF THE NATIONAL INDUSTRIAL POLLUTION CONTROL COUNCIL,
State Univ. of New York Coll. at Cortland. Dept. of Political Science.
H. J. Steck.

Environmental Law, Vol. 5, No. 2, p 241-281 (1975). 41 p, 161 ref.

Descriptors: *Decision making, *Administrative agencies, *Industries, Research facilities, Economic impact, Land use, Industrial wastes, comprehensive planning, Economics, Governments, Institutions, Leadership, Legislation, Planning, Standards, Resources development, Research and development, Federal government, Operations, Natural resources, Costs, Project planning.
Identifiers: *National Industrial Pollution Control Council(NIPCC), *Federal Advisory Committee Act of 1972(FACA).

This article deals with governmental advisory committees and their influence on the formation of policy, in the area of environmental law. Government relies heavily on such committees for expertise. Often such committees are drawn from the private sector, with the inherent danger that the committee's advice will be biased. To minimize this danger, the Federal Advisory Committee Act of 1972 was passed, requiring diversity in committee membership and full disclosure of committee activities. There are various ways of avoiding compliance with the Act, as illustrated by the record of the now defunct National Industrial Pollution Control Council. Originally the Council was created as a consulting body, whose membership was largely composed of heads of the country's biggest corporations. Subsequently, however, it developed into a powerful lobby for industrial interests involved in many levels of government policy making in the environmental sector. Generally, the article explores a major problem facing environmentalists, that is, whether the environmental initiatives of Congress will become entangled or lost in the federal bureaucracy. An explanation of the function of advisory committees as conduits between the public and private sectors is the central theme. (Parrish-Florida)
W76-04346

CASE STUDY OF A HYDROELECTRIC DAM: THE DICKEY-LINCOLN SCHOOL PROJECT,
Massachusetts Inst. of Tech., Cambridge. Civil Engineering Program.
C. Cooper.
Environmental Affairs, Vol. 3, No. 4, p 707-742 (1974). 36 p, 95 ref.

Descriptors: *Project planning, *Hydroelectric project licensing, *Dams, *Economic justification, *Environmental effects, Recreation, Boating, Fishing, Local governments, Ecosystems, Public utilities, Public benefits, Public access, Hydroelectric plants, *Maine, Canada, Flooding, Lakes, Streams, Electric power costs, Electric power demand, Rivers, Regulated flow, Water level fluctuations, Costs.
Identifiers: Dickey-Lincoln Hydroelectric project(Maine), Whitewater canoeing, *St. Johns River(Maine), Energy crisis.

This article examines the proposed Dickey-Lincoln hydroeclectri project to be located on the Upper Saint Johns River in Maine, near the Canadian border. Although once abandoned, this Army Corps of Engineers' project has been rejuvenated, because of higher costs of energy and increasing power demands in the northeast section of the country. The Corps' preliminary studies have been subject to much criticism, mainly because what one group regards as a project benefit, another labels a detriment. In economic terms, if the project is built, the region immediately will experience large benefits. First, a construction boom would result, followed by a sudden drop to a lower level of benefits than those the area would experience if the project were not built at all. Other tradeoffs to be considered include (1) swapping wilderness area recreational uses, such as whitewater canoeing and stream fishing, for lake boating and fishing; and (2) deciding between a relatively small producer of pollution-free renewable, safe power and the relatively 'dirty' nuclear or fossil fuel alternative. (Parrish-Florida)
W76-04347

REQUIREMENTS AND RESPONSIBILITIES OF THE STATE WATER RESOURCES CONTROL (REGULATIONS FOR IMPLEMENTATION OF THE ENVIRONMENTAL QUALITY ACT OF 1970).
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W76-04370

TO EXPAND THE INDIANA DUNES NATIONAL LAKESHORE (HR 3571).
For primary bibliographic entry see Field 6E.
W76-04439

STORM KING MOUNTAIN (PUMP STORAGE PLANT).
For primary bibliographic entry see Field 5G.
W76-04440

PREPARATION OF ENVIRONMENTAL STATEMENTS - GUIDELINES.
Agricultural Stabilization and Conservation Service, Washington, D.C.
39 Federal Register, Vol 39, No 246, p 43996-44002 (1974), 7 p.

Descriptors: *Environmental effects, *Administration, *Environmental control, Legislation, Regulation, Federal jurisdiction, Decision-making, Administrative agencies.
Identifiers: *Environmental impact statements, *Public hearings, *National Environmental Policy Act.

In order to comply with Council on Environmental Quality guidelines, the Agricultural Stabilization and Conservation Service (ASCS) published proposed guidelines concerning the issuance of environmental impact statements (EIS). This publication prompted public response on a number of topics, including: identification of major actions significantly affecting the environment; actions not requiring preparation of EIS; preparation of EIS; and consultation, review and public involvement concerning various sections of the National Environmental Policy Act (NEPA). These comments were considered by the ASCS before it published its final guidelines. These final guidelines, which are presented in full, encompass numerous aspects of the EIS, including: (1) purpose and authority for the EIA; (2) policy justifications for the issuance of the EIS; (3) implementation of the final guidelines by ASCS; (4) identification of major actions significantly affecting the environment; (5) preparation of environmental statements; and (6) an outline of environmental statement content. Finally, the guidelines set down the procedural requirements for the circulation of the environmental statements. (Hoffman-Florida)
W76-04449

SUSQUEHANNA RIVER BASIN COMMISSION - REVIEW OF PROJECTS.
Susquehanna River Basin Commission, Mechanicsburg, Pa.
For primary bibliographic entry see Field 6E.
W76-04451

ATLANTIC BLUEFIN TUNA, PROPOSED 'THREATENED STATUS'.
Fish and Wildlife Service, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04455

7. RESOURCES DATA

7A. Network Design

METHODS OF DETERMINING AREAL RAINFALL FROM OBSERVED DATA,
Bureau of Meteorology, Melbourne (Australia).
For primary bibliographic entry see Field 2B.
W76-04130

DATA NEEDS, AQUISITION, AND AVAILABILITY FOR HYDROLOGIC MODELS,
Snowy Mountains Engineering Corp., Cooma (Australia).
For primary bibliographic entry see Field 7C.
W76-04146

GUIDELINES ON SAMPLING AND STATISTICAL METHODOLOGIES FOR AMBIENT PESTICIDE MONITORING.
Federal Working Group on Pest Management, Washington, D.C.
For primary bibliographic entry see Field 5A.
W76-04315

7B. Data Acquisition

A STUDY OF CONTINUOUS WATER QUALITY MONITORING SYSTEMS,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W76-04006

THE INTERCEPTION PROCESS,
For primary bibliographic entry see Field 2I.
W76-04131

EVAPORATION FROM CATCHMENTS,
Commonwealth Scientific and Industrial Research Organization, Mordialloc (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2D.
W76-04137

MODEL EVALUATION, TESTING AND PARAMETERS ESTIMATION IN HYDROLOGY,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W76-04142

DEFORMATION AND FLOW OF BARNES ICE CAP - BAFFIN ISLAND,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2C.
W76-04151

NIAGARA RIVER ACOUSTIC STREAMFLOW MEASUREMENT SYSTEM,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
R. A. Halliday, W. M. Archer, and P. I. Campbell.
Technical Bulletin, No 86, 1975. 11 p, 10 fig, 2 tab, 11 ref.

Descriptors: *Streamflow, *Measurement, *Instrumentation, Equipment, Velocity, Electronics, Technology, Stage-discharge relations, Flowmeters, Data collections, Hydraulics, Depth, Ice, Weeds, Inflow, Flow rates, Temperature, *Canada.

Identifiers: Transducers, *Niagara River(Canada).

Work conducted in other countries in the 1960's demonstrated the feasibility of using acoustic velocity measurement devices for determining flow in open channels. Accordingly, a decision was made to install one such instrument, the Westinghouse Leading Edge (LE) Flowmeter, on a large Canadian River where there was a demand for 'real time' streamflow data and where the stage-discharge relationship was affected by backwater. Results obtained would be used to determine the feasibility of operating an acoustic streamflow measurement system under Candian conditions. A flow meter having a 1700-foot (530-metre) long acoustic path was installed in 1971 and, despite some installation and operational problems, is providing accurate streamflow data. The plans for the future include telemetry of the data to users and further calibration of the instrument. (Environment Canada)
W76-04165

LIGHT TRANSMISSION THROUGH SNOW AND ICE,
Department of the Environment, Burlington (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 2C.
W76-04178

APPLICATIONS OF MICROWAVES TO REMOTE SENSING OF TERRAIN,
Radiometric Technology, Inc., Wakefield, Mass.
R. A. Porter.
Available from the National Technical Information Service, Springfield, Va 22161. NASA Contractor Report CR-2581, November 1975. 55 p, 1 fig, 1 tab, 15 ref. NASA NAS 1-13126.

Descriptors: *Remote sensing, *Microwaves, *Terrain analysis, Mapping, *Surveys, Exploration, Instrumentation, Aircraft, Satellites(Artificial), Radar, Radiation, Data processing.
Identifiers: *Survey questionnaires.

A survey and study was conducted to define the role that microwaves may play in the measurement of a variety of terrain-related parameters. The survey consisted of discussions with many users and researchers in the field of remote sensing. In addition, a survey questionnaire was prepared and replies were solicited from these and other users and researchers. The results of the survey, and associated bibliography, were studied and conclusions were drawn as to the usefulness of radiometric systems for remote sensing of terrain. (Sims-ISWS)
W76-04314

DEVELOPMENT OF A SEA-ICE THICKNESS GAGE--AN ATTEMPT TO USE SHEAR WAVES,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 2C.
W76-04320

FROM AEROSPACE PHOTOGRAPHS TO FORECASTING AND CALCULATING FLOWS,
G. P. Kalinin.
Available from the National Technical Information Service, Springfield, Va 22161 as N75-13367, $4.50 in paper copy, $2.25 in microfiche. NASA Technical Translation F-16,006, December 1974. 57 p, 10 fig, 2 tab, 42 ref. Translation of 'Ot aerokosmicheskikh snimkov k prognozam; raschetam stoka,' Gidrometeorogich Izd., Leningrad, p 1-41, 1974.

Descriptors: *Remote sensing, *Streamflow forecasting, Aircraft, Satellites(Artificial), *Forecasting, Hydrology, Flow, Runoff, Streams, Streamflow, Watersheds(Basins), Snow cover, Data collections, Data processing, *Aerial photography.
Identifiers: *USSR.

A theoretical basis for using hydrological data obtained by means of remote measurements (from spacecraft and aircraft) was provided. Methods of calculating flow and the characteristics of the snow cover were suggested based on photographs that characterize the dynamics of the hydrological processes that occur on the surfaces of river basins. Problems of experimental investigations leading to new possibilities of analysis and calculation of a number of hydrological elements were posed. The book was intended for hydrological specialists. (Sims-ISWS)
W76-04325

ICE DYNAMICS IN THE CANADIAN ARCHIPELAGO AND ADJACENT ARCTIC BASIN AS DETERMINED BY ERTS-1 OBSERVATIONS,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 2C.
W76-04412

7C. Evaluation, Processing and Publication

DERIVATION AND EVALUATION OF RESERVOIR RULE CURVES,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W76-04014

HYDROLOGIC DATA SUMMARY: CLEARWATER RIVER BASIN, WATER YEAR 1973-1974,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 4C.
W76-04019

SYNTHETIC INPUT DATA TIME SERIES FOR CATCHMENT MODEL TESTING,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 2A.
W76-04144

DATA NEEDS, AQUISITION, AND AVAILABILITY FOR HYDROLOGIC MODELS,
Snowy Mountains Engineering Corp., Cooma (Australia).
J. A. H. Brown.
In: Prediction in Catchment Hydrology. Australian Academy of Science, Canberra, Australia, 1975. p 429-455, 3 tab, 60 ref, append.

Descriptors: *Reviews, *Hydrologic data, *Data collections, *Australia, *Model studies, Sampling, Networks, Data storage and retrieval, Data processing, Meteorological data.

Some of the more general questions concerned with the availability of data for hydrologic models are reviewed; in particular, the sampling problem in space and time, the wide range of data required for some of the modern and sophisticated models, new concepts in data networks, and trends in methods for processing, storing and disseminating the data. The Australian position with respect to the availability and suitability of data for hydrologic models is then summarized. An appendix gives a list of published Australian hydrologic and meteorologic records. (See also W76-04128) (CSIRO)
W76-04146

SURFACE WATER DATA, BRITISH COLUMBIA 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975, 338 p.

Descriptors: *Hydrometry, *Instrumentation, *Gaging, Data collections, Water levels, Water measurement, *Canada.
Identifiers: *British Columbia, Hydrometric surveys, Stream gages.

Tables are presented containing the results of the hydrometric survey conducted in British Columbia during the year 1974, by the Water Survey of Canada under agreement with the Province of British Columbia. Surface water data on daily water levels or discharges, summaries of monthly and annual data, and descriptive information concerning the gauging stations, are found in the tables. (Environment Canada)
W76-04150

DEFORMATION AND FLOW OF BARNES ICE CAP - BAFFIN ISLAND,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2C.
W76-04151

INVENTORY OF CANADAIN FRESHWATER LAKES.
Department of the Environment, Ottawa (Ontario). Inland Waters Directories; Department of the Environment, Ottawa (Ontario). Water Resources Branch.
1973. 34 p, 1 fig, 2 tab, 1 atlas.

Descriptors: *Lakes, *Maps, Surface waters, Water storage, *Canada, Statistical methods, *Surveys.
Identifiers: *Atlas, Lake areas, Islands(Lakes).

An atlas of 999 lakes is organized into three sections which contain: (1) index maps for the Atlantic Provinces, province of Quebec, province of Ontario, Prairie provinces, province of British Columbia, Yukon and Northwest Territories, showing the location, name and identification number of all lakes with total surface aerea in excess of 100 square kilometers. (2) Individual lake maps in numerical order for the whole of Canada, showing the outline of the lake, the islands and other data. (3) A publication 'inventory of Canadain freshwater lakes' which explains procedures for obtaining data, and includes tables showing the grouping of lakes in each region and in Canada according to area. (Environment Canada)
W76-04153

GLACIER SURVEYS IN BRITISH COLUMBIA - 1970,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2C.
W76-04154

NAQUADAT USERS MANUAL,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Demayo, and E. Hunt.
1975, 78 p, 55 fig, 7 tab, 12 ref, 9 append.

Descriptors: *Stations, *Water quality, *Data collections, Publications, Information retrieval, *Canada.
Identifiers: *National Water Quality Data Bank(NAQUADAT), *Dictionary, Data files, *Users manual, Data retrieval.

The development of the National Water Quality Data Bank (NAQUADAT) is described. The structure of the three files making up NAQUADAT - the dictionary, station, and data files are discussed in data. An outline is given of the steps involved in the water quality data collection process in the Water Quality Branch. The various types of retrieval available from NAQUADAT are explained and examples are given. (Environment Canada)
W76-04156

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, NORTHWEST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environmental.
1975, 17 p, 5 fig, 1 tab, 1 map. English and French.

Descriptors: *Precipitation(Atmospheric), *Snowmelt, *Flood peak, Flood frequency, Flood profiles, Damages, Ice jams, Food discharge, *Maps, Mapping, *Canada.
Identifiers: *Flood hazard map, Saint John River, Fredericton, *New Brunswick, Flooding problems, Nashwaaksis Stream, Baker Brook.

This map, one of the two flood hazard maps for the Fredericton area, provides information which may be useful in land use planning, such as prevention of unsuitable land development in flood plain areas, protection of homebuyers, planning of emergency operations in advance of an impending flood, and preservation of open space for public use. An information booklet, provided with the map, discusses the problem of flooding in the Fredericton area, flood mangitudes and frequencies, and flood profiles. Use of the flood hazard map is also considered. (Environment Canada)
W76-04157

FLOOD HAZARD MAP, FREDERICTON AREA, NEW BRUNSWICK, SOUTHEAST SHEET.
Department of the Environment, Ottawa (Ontario); and New Brunswick Dept. of Fisheries and Environment.
1975, 17 p, 5 fig, 1 tab, 1 map. English and French.

Descriptors: *Precipation(Atmoshperic), *Snowmelt, *Flood peak, Flood frequency, Flood profiles, Damages, Ice jams, Flood discharge, *Canada, *Maps, Mapping.
Identifiers: *Flood hazard map, Saint John River, Fredericton, *New Brunswick, Flooding problems, Nashwaaksis Stream, Baker Brook, Reversing Falls, Mactaquac Dam.

This map, one of two flood hazard maps for the Fredericton area, provides information which may be useful in land use planning, such as prevention of unsuitable land development in flood plain areas, protection of homebuyers, planning of emergency operations in advance of an impending flood, and preservation of open space for public use. An information booklet, provided with the map, discusses the problem of flooding in the Fredericton area, flood magnitudes and frequencies, and flood profiles. Use of the flood hazard maps is also considered. (Environment Canada)
W76-04158

REFERENCE INDEX - CANADA 1972 - HYDROMETRIC MAP SUPPLEMENT.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1973, 13 maps.

Descriptors: *Hydrometry, *Maps, *Gaging stations, *Canada, Water levels, Discharge(Water).
Identifiers: *Hydrometric data, Hydrometric stations.

This is the first edition of the Hydrometric Map Supplement to the Surface Water Data Reference Index. Hydrometric Map Supplements will be produced probably every three years. The maps are intended to serve as a guide to the user to identify the locations of gauging stations at which hydrometric data are available. Different symbols are used to indicate the type of data collected, i.e., whether it is water level data or discharge data, and whether the station is active or discontinued. Information on the station name, drainage area, gauge location, discharge records, type of gauge, operation, magnetic tape, and additional notes are given in the main body of the Reference Index. Maps are prepared for the following provinces or regions: Atlantic Provinces, British Columbia, Ontario, Prairie Provinces, Quebec, Yukon and Northwest Territories. Two sets of maps are enclosed for each of the provinces or regions except Quebec. One set of maps shows all the active gauging stations contained in the 1972 Surface Water Data Reference Index, the other set shows all the discontinued stations. Both active and discontinued stations operated by the Federal Government in the Province of Quebec are shown on the one Quebec map. (Environment Canada)
W76-04160

INDUSTRIAL WATER RESOURCES OF CANADA; HUDSON BAY, LABRADOR AND ARCTIC DRAINAGE BASINS, 1959-1965,
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Ontario). Inland Water Directorate.
For primary bibliographic entry see Field 3E.
W76-04163

SURFACE WATER DATA, ALBERTA 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.

Descriptors: *Hydrometry, *Surveys, *Surface waters, *Water levels, Gaging stations, *Data collections, Instrumentation, Drainage area, Stage-discharge relations, Discharge(Water), *Canada, *Hydrologic data.
Identifiers: *Alberta, Descriptive information, Hydrometric survey.

Tables are presented containing the 1974 results of a hydrometric survey conducted in Alberta by the Water Survey of Canada, under agreement with the Province of Alberta. Surface water data include tables of daily water levels or discharge, summaries of monthly and annual data, and descriptive information, for each gauging station. (Environment Canada)
W76-04167

SURFACE WATER DATA, ALBERTA 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1974, 204 p, 397 tab.

Descriptors: *Hydrometry, *Surface waters, *Surveys, *Water levels, Streamflow, Drainage, Water supply, Monitoring, *Hydrologic data, *Canada, *Data collections.
Identifiers: Discharge(Rates), Flow regulation, Instantaneous discharge, *Alberta.

For the 1973 calendar year, results are presented of the Hydrometric Survey investigations made by the Water Survey of Canada in Alberta. For each of 397 stations, either daily discharge in cfs, or daily water levels in feet are given. In addition, there is a summary including mean discharge, total discharge, maximum and minimum daily discharge, and maximum instantaneous discharge. The type of gauge used, the location, the size of drainage area and the presence or lack of regulating structures are also noted. (Environment Canada)
W76-04168

SURFACE WATER DATA, ATLANTIC PROVINCES 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.

Descriptors: *Water levels, *Fluctuations, Discharge(Water), Streamflow, Hydrometry, Monitoring, Surveys, Stage-discharge relations, Lakes, Rivers, Streams, Reservoirs, Data collections, Control, Water supply, *Canada, *Hydrologic data.
Identifiers: Flow regulation.

For the 1973 calendar year, results are presented of the hydrometric survey investigations made in the Atlantic provinces by the Water Survey of Canada. For each of 163 station (Prince Edward Island - 11, Nova Scotia - 42, New Brunswick - 69, Newfoundland and Labrador - 41), either daily discharges in cfs, or daily water levels in feet are given. In addition, each station report includes a summary containing mean discharge, total discharge, maximum and minimum daily discharge and maximum instantaneous discharge. The type of gauge used, location of station, the size of the drainage area, and the presence or absence of regulating structures are also noted. (Environment Canada)
W76-04169

SURFACE WATER DATA, SASKATCHEWAN 1973.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1974. 161 p, 314 tab.

Descriptors: *Water levels, Discharge(Water), Lakes, River, Streams, *Hydrometry, Drainage, Monitoring, *Surveys, Fluctuations, Measurement, Water supply, Hydrologic data, *Canada, Data collections.
Identifiers: Instantaneous discharge, *Saskatchewan.

For the 1973 calendar year results are presented of the Hydrometric Survey investigations made in Saskatchewan by the Water Survey of Canada. For each of 314 stations, either daily discharge in cfs, or daily water levels in feet are given. In addition, each station report includes a summary containing mean discharge, total discharge, maximum and minimum daily discharge and maximum instantaneous discharge. The type of gauge used, location of station, the size of the drainage area, and the presence or absence of regulating structures are also noted. (Environment Canada)
W76-04170

WATER QUALITY DATA, BRITISH COLUMBIA 1961 - 71.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate; Department of the Environment, Ottawa (Ontario). Water Quality Branch.
1974, (600 p).

Descriptors: *Surface waters, *Water quality, Phosphorus, Fluorides, Chlorides, Sulphates,

Chemical oxygen demand, Bicarbonates, Dissolved solids, Calcium, Magnesium, Potassium, Sodium, Sampling, Chemical analysis, Water analysis, Water pollution, *Data collections, *Canada.
Identifiers: Reactive silica, *British Columbia.

Water quality data, collected under the National Water Quality Monitoring Program, from 319 sampling stations in British Columbia are given. The first section presents detailed analytical results from the period 1961 to 1971; the second presents a summary of the data, minima, maxima, and median values. The indices of water quality measured include pH, color, turbidity, specific conductivity, total dissolved solids, hardness, alkalinity and concentrations of various elements and compounds. The dae, precise location and where available, time and daily mean discharge are also given. (Environment Canada)
W76-04171

PROGRAM FRONT, TWO - DIMENSIONAL SIMULATION OF A MOVING INTRUSION FRONT IN A THIN HORIZONTAL CONFINED AQUIFER,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vanderberg.
1975, 40 p, 7 fig, 4 ref, 2 tab, append.

Descriptors: *Computer programs, *Aquifers, *Saline water intrusion, Interfaces, Groundwater, Pumps, Porosity, Computers, Data collections, Methodology, Aqueous solutions.
Identifiers: Cones, Nodes, Grid element.

Documentation is presented for the application of computer program FRONT (Two Dimensional Simulation of a Moving Intrusion Front in a Thin Horizontal Confined Aquifer). FRONT uses the time-variant piezometric head, the transmissivity, the thickness and the porosity of the aquifer to calculate the seepage velocity at any point of the aquifer at any time. By following the motion of a number of points on the intrusion front, the growth of the zone of encroachment can be followed through time. The piezometric head and the transmissivity are defined at the nodes of a rectangular grid superimposed on the aquifer; the thickness and porosity are assumed constant over the aquifer. Furthermore, the piezometric head is assumed to be input to the program as a time series in the form in which it is output on mass storage by program SOPH. The preparation of the input card deck is described in detail and further clarified by an example. A listing of the FORTRAN program is given in the Appendix. (Environment Canada)
W76-04172

PROGRAM TEBES, TRANSMISSIVITY, LEAKAGE FACTOR AND STORATIVITY FROM A LEAST SQUARES FIT OF RESIDUAL DRAWDOWN,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vanderberg.
1975, 27 p, 2 tab, 7 ref, append.

Descriptors: *Computer programs, *Transmissivity, *Leakage, Least squares method, Systems analysis, Aquifers, *Drawdown, Groundwater.
Identifiers: *Program TEBES, *Storativity, Newton iterative, Residual drawdown.

Necessary documentation is presented for the application of computer program TEBES (Transmissivity, Leakage Factor and Storativity from a Least Squares Fit of Residual Drawdown). TEBES employs the extended Newton iterative method to calculate the transmissivity, leakage factor and storativity, which when substituted in the equation for the residual drawdown in an infinite, homogeneous and isotropic, leaky aquifer, yield the best fit (in the least squares sense) to the measured residual drawdown. The preparation of the impact card deck is described in detail and further clarified by an example. A listing of the FORTRAN program is given in the Appendix. (Environment Canada)
W76-04181

AUTOMATED STREAMFLOW COMPUTATIONS.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch.

Descriptors: *Streamflow, *Data collections, *Data processing, Water levels, Water supply, Gaging, Backwater, Monitoring, Charts, Weirs, *Streamflow forecasting.
Identifiers: *Computer applications, Discharge rates, Recording, Documents, Graphs, Outputs.

This manual provides detailed instructionf or digitizing water level recorder charts on a pencil follower to obtain punched cards containing the x,y coordinates. With these cards and the card decks defining the stage - discharge relationship, gauge and shift corrections and updating corrections, the computer program, STREAM, is used to obtain daily mean gauge heights and discharges along with the appropriate symbols. Options available include: three- or twelve- month pages of daily data with monthly summaries; card output of daily discharges or daily water levels; linear charts; weir stations, with water levels printed to the nearest .001 of a foot; plotted output of digitized chart record or daily discharges or water levels. Introductory sections give information on definitions and machine configuration and timing. Explanations of how the program subdivides the record to compute daily discharges, how to prepare charts for digitizing, hardware setup and operation instructions for all stages as well as quality checking, are included. (Environmental Canada)
W76-04241

SURFACE WATER DATA ATLANTIC PROVINCES 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975, 93 p.

Descriptors: *Data collections, Drainage area, Instrumentation, Streamflow, Rivers, Hydrometry, Surveys, *Canada.
Identifiers: *Surface water data, *Atlantic Provinces, Daily water level, Daily water discharge, Monthly data, Newfoundland, Labrador, Prince Edward Island, New Brunswick, Nova Scotia.

The results of the hydrometric survey investigations made in the Atlantic Provinces, during the year 1974, are presented in table form. Information given for each gauging station includes a table of daily water level or discharge, a summary of monthly and annual data, and descriptive information such as the type of gauge, location of gauging station, and drainage area. (Environment Canada)
W76-04248

SURFACE WATER DATA, YUKON AND THE NORTHWEST TERRITORIES 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975, 62 p.

Descriptors: *Data collections, Drainage area, Instrumentation, Streamflow, Rivers, Hydrometry, Surveys, Discharges, *Canada.
Identifiers: *Surface water data, *Yukon, 8northwest Territories, Daily water level, Daily water discharge, Monthly data.

The results of the hydrometric survey investigations made in the Yukon and the Northwest Territories, during the year 1974, are presented in table form. Information given for each gauging station includes a table of daily water level or discharge, a summary of monthly and annual data, and descriptive information such as the type of gauge, location of gauging station, and drainage area. (Environment Canada)
W76-04249

SURFACE WATER DATA, MANITOBA 1974.
Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975, 157 p.

Descriptors: *Data collections, *Water levels, Drainage area, Natural flow, Regulated flow, Bodies of water, Lakes, Discharge(Water), Gaging stations, *Canada.
Identifiers: *Hydrometric survey, *Surface water data, *Manitoba.

Results are presented of the hydrometric survey investigations which were made in 1974 in Manitoba by the Water Survey of Canada under agreement with the Province of Manitoba. Gauging stations were set up and surface water data collected. Data are presented in tables of daily water level or discharge, and summaries, are included of monthly and annual data. Descriptive information for each station including type of gauge, location of gauge, and drainage area is also given. (Environment Canada)
W76-04250

SEDIMENT DATA - CANADIAN RIVERS 1971.
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975. 282 p, 2 maps.

Descriptors: *Erosion, *Streamflow, *Sediments, *Data collections, Suspended solids, Water temperature, Suspended load, Surveys, Sediment yield, *Canada, *Rivers.
Identifiers: *Sediment survey, Suspended sediment concentration, Suspended sediment discharge, Hydrometric survey, Sediment sampling, Particle size analysis.

The results of sediment survey investigations in Canada during 1971 have been compiled and presented. Included are data, from sediment samplers, on streamflow, daily suspended sediment discharges, daily mean suspended sediment concentration, particle size distribution of bedload, particle size distribution of bed material, and water temperatures. (Environment Canada)
W76-04251

USES OF WATER RESOURCES DATA,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
P. I. Campbell.
1975. 6 p, 6 photos.

Descriptors: *Water resources, *Data collections, *Water management(Applied), Hydrometry,

Streamflow, Water levels, Discharge(Water), Temperature, Velocity, Sediments, Glaciers, Hydrologic data.
Identifiers: Ice thickness.

Hydrometric data, a type of water resources data, have a wide variety of uses and users. Basic hydrometric data are essential for the wise management of Canadian water resources and are necessary to regulate resources during times of extreme flows, to develop water for the most beneficial uses, to ensure that each user receives his equitable share and, as well, to achieve, these purposes in the most economical manner. The wide variety of uses of hydrometric data, is illustrated. (Environment Canada)
W76-04255

SURFACE WATER DATA, ONTARIO 1974.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
Water Survey of Canada, 1975, 233 p.

Descriptors: *Surface waters, *Data collections, *Hydrometry, Water levels, Discharge(Water), Instrumentation, Gages, Surveys, *Canada, Hydrologic data.
Identifiers: *Ontario.

The results of the hydrometric survey investigations which were made in Ontario during the year 1974 by the Water Survey of Canada, under agreement with the province of Ontario, are presented. Tables containing information on daily water levels of discharge, summaries of monthly and annual data, and descriptive information are presented for each gauging station. Descriptive information includes type of gauge, location and drainage area. (Environment Canada)
W76-04256

WATER QUALITY DATA, YUKON TERRITORY 1961 - 1973.
Department of the Environment, Ottawa (Ontario). Water Quality Branch; and Department of the Environment, Ottawa (Pntario). Inland Waters Directorate.
1975, 155 p.

Descriptors: *Water Quality, *Data collections, Water temperature, Flow, Discharge(Water), Gaging stations, *Canada, *Hydrologic data.
Identifiers: *YukonTerritory(Canada), Discharge, Hydrometric data, NAQUADAT.

Presented in table form are water quality data for the Yukon Territory during the years 1961 to 1973. These data have been determined in Water Quality Branch laboratories as part of the National Water Quality Monitoring Program. This summary of Water Quality Data contains information on water temperature, water flow and discharge for various specific locations within the Yukon. A guide to the use of tables is included. (Environment Canada)
W76-04257

FURTHER CLIMATOLOGICAL STUDIES OF BAFFIN ISLAND, NORTHWEST TERRITORIES,
Department of the Environment, Ottawa (Ontario). Water Resources Branch; and Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 2B.
W76-04259

FLOOD DAMAGE IN FREDERICTION.
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
1975, 11 fig.

Descriptors: *Floods, *Flood forecasting, *Flood damage, Flood plains, Watershed management, Hazards, Flood protection, Dams, *Maps, *Canada.
Identifiers: *Emergency measures, Flood proofing, *Frederiction(New Brunswick).

This map shows regions flooded in the Frederiction area during the year 1973. Accompanying the map is a brief information sheet which discusses floods. the flood plain, flood plain management, flood damages, emergency measures, and measures to reduce flood damages, including engineering works, preventive measures, and flood plain regulations. (Environment Canada)
W76-04260

PREDICTING PROFILES OF SNOWDRIFTS IN TOPOGRAPHIC CATCHMENTS,
Forest Service (USDA), Laramie, Wyo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W76-04288

AUSTRALIA DAMS AND STORAGES.
Department of Minerals and Energy, Canberra (Australia). Div. of National Mapping.
Map NMP 74/093, 1975. 1 p, $1.20.

Descriptors: *Maps, *Reservoirs, *Dams, *Australia, Rivers, Streams, Watersheds(Basins), Basins, Drainage, Water storage, Data collections.

On a 1:5,000,000 scale map, the 12 drainage divisions of Australia were shown by different colors. Drainage basin boundaries are delineated. The locations of 340 dams were plotted, along with a key which refers to tables located around the margins of the map. For each division having dams and storage reservoirs, a table listed the name of each dam with its key number, and tabulated other information about the dam and reservoir. The capacity of each reservoir was listed along with the height of the dam crest above the lowest point in the foundation. One or more purposes were given for each storage, chosen from the following list: (1) irrigation, (2) hydroelectric generation, (3) water supply, (4) flood control, (5) navigation, (6) recreation and (7) waste disposal. The streams and rivers were depicted on the map in lines which show the general magnitude of the discharge and the seasonal characteristics of the stream. The larger lakes and reservoirs were shown by their general shapes on the map. Two shades of blue distinguish reservoirs with surface areas greater than and less than 50 sq km. (Sims-ISWS)
W76-04307

ANALYSIS AND SYNTHESIS OF FLOOD CONTROL MEASURES,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W76-04308

APPLICATIONS OF MICROWAVES TO REMOTE SENSING OF TERRAIN,
Radiometric Technology, Inc., Wakefield, Mass.
For primary bibliographic entry see Field 7B.
W76-04314

CASCADE PASSES AVALANCHE ATLAS, PART I: CHINOOK, CAYUSE, WHITE AND SNOQUALMIE PASSES,
Washington Univ., Seattle. Dept. of Civil Engineering; and Washington Div., Seattle. Geophysics Programs.
E. R. LaChapelle, C. B. Brown, and R. J. Evans.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-237 435, $5.25 in paper copy, $2.25 in microfiche. Report, August 1974, 103 p.

Descriptors: *Maps, *Avalanches, *Highways, *Snow, *Washington, Surveys, Erosion, Hazards, Safety, Landslides, Snowpacks, Snow management.

This compilation of avalanche paths affecting Washington State highways extends in the same format the information published in 1971 as the North Cascades Highway Avalanche Atlas, Part II, in preparation, will cover Stevens Pass and Tumwater Canyon. The North Cascades Highway Atlas was prepared on the basis of extensive aerial and ground reconnaissance in a hitherto inaccessible wilderness area where no previous record of avalanche occurrence was available. Compilation for the Cascade Passes has proceeded on the same basis, with the added advantage that all of the areas in question have long been traversed by highways for which considerable historical records exist. In the case of the North Cascades Highway, identification of avalanche paths was based on objective appraisal of terrain and vegetation patterns, leading to an accurate and highly consistent compilation. In the present Cascade Passes Atlas, there are many instances where objective evidence and historical accounts fail to agree. These conflicts have been resolved in the final editing of this Atlas according to the best available evidence, but in some case necessarily in an arbitrary fashion. (Sims-ISWS)
W76-04318

CORRELATION ANALYSIS OF WIND AND ICE DRIFT DATA TAKEN AT LINCOLN BAY 1972,
Defence Research Establishment, Ottawa (Ontario).
For primary bibliographic entry see Field 2C.
W76-04322

PROBLEMS OF CALCULATING THE THERMAL RADIATION OF MULTILAYERED STRUCTURES OF THE ICE AND SNOW TYPES BY MEANS OF ORIENTED GRAPHS USING AN ELECTRONIC COMPUTER,
For primary bibliographic entry see Field 2C.
W76-04324

THE USE AND LEGAL SIGNIFICANCE OF THE MEAN HIGH WATER LINE IN COASTAL BOUNDARY MAPPING,
Spessard L. Holland Law Center, Gainesville, Fla.
For primary bibliographic entry see Field 6E.
W76-04355

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1970: PARTS 4 AND 5. ST. LAWRENCE RIVER BASIN, AND HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS.
Geological Survey, Reston, Va.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, price, $4.15. Water-Supply Paper 2154, 1975. 482 p, 1 fig, 41 ref.

Descriptors: *Pollutant identification, *Water quality, Surface waters, *Sediment transport, *Water temperature, *Basic data collections, Water analysis, River basins, Physical properties, Particle size, Chemical analysis, Inorganic compounds, Organic compounds, Water chemistry, Biochemistry, Streamflow, Flow measurement.
Identifiers: *St Lawrence River basin, *Hudson Bay, *Upper Mississippi River basin.

During the water year ending September 30, 1970, the Geological Survey maintained 170 stations on 107 streams in the St. Lawrence River basin, and Hudson Bay and Upper Mississippi River basins for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 116 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 72 and daily at 25 stations. Daily water temperatures were measured at most of the stations at the time samples were collected for chemical quality or sediment content. So far as practicable, the water temperatures were taken at about the same time each day. Quantities of suspended sediment are re-

ported for 31 stations. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined at 19 stations. The stream discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges obtained at the time samples were collected and computed from a stage-discharge relation or from a discharge measurement. (Woodard-USGS)
W76-04392

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1969: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Reston, Va.
Available from Supt. of Documents, GPO, Wash., D.C. 20402, Price $3.85. Water-Supply Paper 2146, 1974. 540 p, 1 fig, 40 ref.

Descriptors: *Pollutant identification, *Water quality, *Surface waters, *Sediment transport, *Water temperature, *Mississippi River basin, Basic data collections, Arkansas, Colorado, Kansas, Kentucky, Louisiana, Mississippi, Missouri, New Mexico, Oklahoma, Texas, Physical properties, Particle size, Chemical analysis, Inorganic compounds, Biological properties, Streamflow, Sampling, Sites.
Identifiers: *Lower Mississippi River basin.

During the water year ending September 30, 1969, the Geological Survey maintained 259 stations on 156 streams in the Lower Mississippi River basin for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 235 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 28 and daily at 79 stations. Daily water temperatures were measure at most of the stations at the time samples were collected for chemical quality or sediment content. So far as practicable, the water temperatures were taken at about the same time each day. Quantities of suspended sediment are reported for 19 stations. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined at 19 stations. The stream discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges obtained at the time samples were collected and computed from a stage-discharge relation or from a discharge measurement. (Woodard-USGS)
W76-04393

WATER-LEVEL RECORDS FOR COLORADO, 1971-75,
Geological Survey, Denver, Colo.
T. J. Major, L. Kerbs, and R. D. Penley.
Colorado Water Conservation Board, Denver, Colorado Water Resources Basic-Data Release No 37, 1975. 356 p, 65 fig, 2 tab, 61 ref.

Descriptors: *Water levels, *Groundwater, *Water wells, *Water level fluctuations, *Colorado, Water level recorders, *Basic data collections, Sites, Well data, Aquifers.

Water-level measurements made in Colorado prior to the irrigation season in 1975 are presented. Measurements from 1971-74 were made at the same time of year and are included to serve as references illustrating declining or rising water levels. The number of wells that were measured was dependent, partly, on the size of the aquifer and on the intensity of groundwater use. West of the Continental Divide, where groundwater withdrawal is low, the water-level fluctuations reflect mostly changes in natural conditions. East of the Continental Divide, because of substantial utilization of groundwater by man, the major fluctuations are caused by artificial withdrawal. Hydrographs and water-level change maps are included to illustrate responses to natural and man-made stresses on the aquifer. (Woodard-USGS)
W76-04394

WATER-QUALITY DATA FROM OIL AND GAS WELLS IN PART OF THE PERMIAN BASIN, SOUTHEASTERN NEW MEXICO AND WESTERN TEXAS,
Geological Survey, Albuquerque, N. Mex.
W. L. Hiss.
Open-file report 75-579, November 1975. 283 p, 14 fig, 7 tab, 18 ref.

Descriptors: *Water quality, *Groundwater, *Oil wells, *New Mexico, *Texas, Well data, Data collection, Geology, Geologic formations, Data processing, Chemical analysis, Saline water, Correlation analysis, Dissolved solids, Chlorides, Density, Computer programs.
Identifiers: Northeastern New Mexico, Western Texas.

Approximately 8,000 chemical analyses of water produced from formations of several geologic ages in northeastern New Mexico and western Texas are tabulated by both geographic location and geologic formation. Empirical and mathematical relationships between (1) the dissolved solids and the measured and computed resistivity of water, the chloride-ion concentration and the density, and (2) the concentration of chloride-ion and the density and resistivity of water, were established. Resistivities of water computed following a method developed by Moore, Szasz, and Whitney (1966) using the concentration of the six most common constituents dissolved in natural water correlate favorably with the measured resistivities of natural water. The water analyses were obtained chiefly from oil companies and oil-service companies operating in the western part of the Permian basin. (Woodard-USGS)
W76-04395

INTERPRETATION OF GEOLOGIC AND HYDROLOGIC DATA FROM THE RAY-1 WELL, CITY OF GALLUP, MCKINLEY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 4B.
W76-04396

GRAPHIC AND TABULAR SUMMARIES OF WATER AND SUSPENDED-SEDIMENT DISCHARGE DURING EIGHT PERIODS OF SYNOPTIC STORM SAMPLING IN THE LOWER DRAINAGE BASIN OF REDWOOD CREEK, HUMBOLDT COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
R. J. Janda, K. M. Nolan, and D. R. Harden.
Open-file report, December 1975. 23 p, 8 fig, 2 plate, 10 tab, 2 ref.

Descriptors: *Streamflow, *Discharge(Water), *Sediment transport, *Storms, *California, River basins, Basic data collections, Sampling, Land use, Hydrologic data, Peak discharge, Rainfall-runoff relationships, Synoptic analysis.
Identifiers: Humboldt County(Calif), *Redwood Creek(Calif).

Graphs and tables summarize basic data in the lower drainage basin of Redwood Creek, Humboldt County, Calif. Data were collected throughout eight storms of low to moderate intensity between November 1973 and February 1975. Collection sites were located on Redwood Creek and seven of its tributaries. Also included are photographs and tables that indicate the location and physical properties of the drainage basins selected for synoptic studies. (Woodard-USGS)
W76-04398

A SURVEY OF THE WATER RESOURCES OF ST. CROIX, VIRGIN ISLANDS,
Geologic Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 4A.
W76-04399

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1974,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W76-04403

POTENTIOMETRIC SURFACE AND AREAS OF ARTESIAN FLOW OF THE FLORIDIAN AQUIFER IN FLORIDA, MAY 1974,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Bureau of Geology, Tallahassee, Map Series No 73, 1975. 1 sheet, 2 fig, 17 ref.

Descriptors: *Potentiometric level, *Artesian aquifers, *Water supply, *Groundwater resources, *Aquifer characteristics, *Florida, Maps, Water supply, Water yield, Water utilization.
Identifiers: *Floridan aquifer.

The configuration of the potentiometric surface and the areas of artesian flow of the Floridan aquifer in Florida as of May 1974 are shown on maps. The potentiometric surface is the level to which water will rise in tightly cased wells that tap the aquifer. The level of the surface is referenced to sea level. The position of the potentiometric surface for May 1974 is based on water levels measured in 670 wells in Florida. The water levels were measured and the maps prepared as an integral part of the continuing cooperative program of monitoring the groundwater resources of the state. The Floridan aquifer is part of an artesian aquifer system that extends over 82,000 sq mi in Florida, southern Alabama, southeastern Georgia, and part of South Carolina, and is a principal source of groundwater supplies in these areas. In Florida, the aquifer consists chiefly of limestone formations ranging from middle Eocene to Miocene in age. The aquifer is the major source of fresh groundwater supplies in the State of Florida. In 1970, the aquifer supplied about 280 mgd for municipal use, 710 mgd for agricultural use, and 360 mgd for industrial use. This total demand of 1,350 mgd represents 47 percent of the total daily fresh groundwater use in the State. (Woodard-USGS)
W76-04405

FLOW-DURATION AND LOW-FLOW FREQUENCY DETERMINATIONS OF SELECTED ARKANSAS STREAMS,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 4A.
W76-04406

COCKEYSVILLE QUADRANGLE: GEOLOGY, HYDROLOGY AND MINERAL RESOURCES,
Geological Survey, Parkville, Md.
E. G. Otton, E. T. Cleaves, W. P. Crowley, K. R. Kuff, and J. Reinhardt.
Maryland Geological Survey, Baltimore, Quadrangle Atlas No 3, 1975. 8 maps. 10 ref.

Descriptors: *Hydrogeology, *Geology, *Mineralology, *Maps, *Maryland, Water wells, Springs, Water table, Groundwater resources, Available water, Underground waste disposal, Sewage disposal, Percolation, Environmental effects.
Identifiers: Cockeysville quadrangle(Md), Mineral resources.

This folio describes the geology, hydrology, and mineral resources of a 7 1/2 minute topographic quadrangle in north-central Maryland. It is intended for county, State and Federal officials as well as engineers, planners, developers, industrilists, and the general public involved in environmental matters such as water supply, waste disposal, and land-use planning. The Cockeysville quadrangel covers an area of 57.3 square miles and lies entirely within Baltimore County. No incorporated towns are in the quadrange, but the communities of Cockeysville, Ruxton, Pikesville, and Lutherville lie wholly or partly within it. The quadrangle lies on the suburban fringe of Baltimore City, and its southern limit is 0.2 mile north of the city line. The maps and the associated text show: the location of several hundred wells and a few springs and test borings; the approximate depth to the water table; availability of groundwater supplies; and geohydrologic conditions pertaining to underground sewage effluent disposal. (Woodard-USGS)
W76-04407

GROUND-WATER RESOURCES OF WAUKESHA COUNTY, WISCONSIN,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 2F.
W76-04408

8. ENGINEERING WORKS

8A. Structures

DYNAMIC PROPERTIES OF SAN BERNARDINO INTAKE TOWER,
California Univ., Berkeley. Earthquake Engineering Research Center.
D. Rea, C-Y. Liaw, and A. K. Chopra.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A008 406, $4.50 in paper copy, $2.25 in microfiche. Report No EERC 75-7, February 1975. 62 p, 32 fig, 6 tab, 9 ref. DACW73-71-C-0051.

Descriptors: *Intakes structures, *Intakes, *Earrthquake engineering, *Vibrations, *California, Earthquakes, Structures, Towers, Structural stability, Engineering, Resonance, On-site investigations, On-site tests, Hydrodynamics, Dynamics, Non-destructive tests, Testing procedures.
Identifiers: *Intake towers, *San Bernardino(Calif).

Three series of forced vibration tests were conducted on the intake tower located in Silverwood Lake near San Bernardino, California. In the first test series the water level in the reservoir was just above the base of the tower so the effects of water on its behavior were negligible. In the second and third series the water submerged nearly two-thirds of the tower. In the second test series the inside of the tower was empty, whereas in the third series the tower was filled with water to the same level as the water in the reservoir. Of the seven modes excited during the forced vibration tests, only one mode would be excited with significant amplitudes during strong earthquake ground motion. The natural frequency of this mode was 2.1, 2.0, and 1.9 cps in the first, second, and third test series respectively, and its damping factor lay in the range 1.0 - 1.2% of critical damping for each series. The changes in resonant frequencies between test series, together with the measured mode shapes and estimated mass distributions of the tower-bridge system were used to calculate the added mass effects of water outside and inside the tower. The added mass effects could not be determined with sufficient precision by this method to check the accuracy of analytical methods of calculating added masses. However, the analytical method was found to predict accurately the dynamic water pressure distributions that were measured during the tests. (Sims-ISWS)
W76-04107

SPILLWAY FOR DORENA DAM, ROW RIVER, OREGON; HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 310, $5.00 in paper copy, $2.25 in microfiche. Report No 27-1, May 1953. 94 p, 46 fig, 11 tab.

Descriptors: *Model studies, *Hydraulic models, *Spillways, *Oregon, Dams, Settling basins, Baffles, Abutments, Rivers, Structures, Hydraulic structures, Hydraulics, Hydraulic properties, Civil engineering.
Identifiers: *Dorena Dam(Ore), *Row River(Ore).

Dorena Dam and Reservoir has been constructed on the Row River approximately 46 highway miles south-southeast from Eugene, Oregon, and about 165 highway miles south of Portland, Oregon. Model investigations of the gravity spillway plan for Dorena Dam were conducted. The general purpose of the investigations was to check the adequacy of the original gravity-type-spillway design and, where possible, to make revisions in design which would improve hydraulic efficiency. (Sims-ISWS)
W76-04110

CONCRETE ABRASION STUDY, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
For primary bibliographic entry see Field 8F.
W76-04111

SIDE-CHANNEL SPILLWAY NORTH HARLAND DAM, OTTAUQUECHEE RIVER, VERMONT; HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04114

MODEL STUDY OF THE SPILLWAY AND TUNNEL FOR DORENA DAM, ROW RIVER, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04115

REVISED STILLING BASIN, BONNEVILLE DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04116

MODEL STUDY OF THE 23-FT. OUTLET TUNNEL FOR MUD MOUNTAIN DAM, ENUMCLAW, WASHINGTON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04120

SIDE-CHANNEL SPILLWAY AND OUTLET WORKS FOR LOOKOUT POINT DAM, MIDDLE FORK WILLAMETTE RIVER, OREGON, HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04124

SPILLWAY AND STILLING BASIN FOR THE DALLES DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04125

OUTLET WORKS AND STILLING BASIN FOR COUGAR RESERVOIR, SOUTH FORK MCKENZIE RIVER, OREGON; HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04126

THE DALLES DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04127

FIELD CALIBRATION OF FLOW MEASURING STRUCTURES,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 8G.
W76-04302

CASE STUDY OF A HYDROELECTRIC DAM: THE DICKEY-LINCOLN SCHOOL PROJECT,
Massachusetts Inst. of Tech., Cambridge. Civil Engineering Program.
For primary bibliographic entry see Field 6G.
W76-04347

STORM KING MOUNTAIN (PUMP STORAGE PLANT).
For primary bibliographic entry see Field 5G.
W76-04440

SUSQUEHANNA RIVER BASIN COMMISSION - REVIEW OF PROJECTS.
Susquehanna River Basin Commission, Mechanicsburg, Pa.
For primary bibliographic entry see Field 6E.
W76-04451

8B. Hydraulics

YOUR DOWNHOLE MOTOR: HEY, WHERE'D IT GO.
For primary bibliographic entry see Field 8C.
W76-04050

NAVIGATION CHENNEL IMPROVEMENT AT BONNEVILLE DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 330, $5.50 in paper copy, $2.25 in microfiche. Technical Report No 100-1, May 1966. 125 p, 102 fig, 7 tab.

Descriptors: *Model studies, *Navigation, *Bonneville Dam, *Columbia River, Velocity, Channel flow, Flow, Dams, Spillways, Navigable waters, Current(Water), Channel Improvement, Channels, Stream improvement, Rivers, Hydraulics, Hydraulic models, Dredging, Civil engineering.

An undistorted 1:130-scale hydraulic model was used to develop a plan for reducing hazardous conditions that affected upstream-bound river traffic in a 4-mile reach of the Columbia River just below Bonneville Dam. Before 1959, when the study was made, river traffic past Bonneville Dame consisted principally of tug-propelled log rafts and barges, but it was expected that upstream industrial development and completion of the authorized 27-ft-deep navigation channel from Vancouver, Washington, to The Dallas, Oregon, would encourage use of the navigation lock by deep-draft vessels. A radio-controlled model of a type C-4 cargo ship was used to check the effectiveness of various improvement plans that were studied. It was concluded that the most satisfactory solution to navigation problems caused by high velocities and severe cross currents would include 1,327,000 cu yd of excavation. Locations for placing excavated material were determined during the study. In addition to navigation benefits, the recommended plan would increase powerhouse head (by lowering tailwater depth) from 0.6 to 1.3 ft for river discharges between 100,000 and 800,000 cfs, respectively. (Sims-ISWS)
W76-04109

SPILLWAY FOR DORENA DAM, ROW RIVER, OREGON; HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8A.
W76-04110

SIDE-CHANNEL SPILLWAY NORTH HARLAND DAM, OTTAUQUECHEE RIVER, VERMONT; HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 322, $4.50 in paper copy, $2.25 in microfiche. Technical Report No 86-1, December 1959. 52 p, 34 fig, 4 tab, append.

Descriptors: *Model studies, *Hydraulic models, *Spillways, Dams, Structures, Hydraulic structures, Outlet works, Hydraulics, Channel flow, Channels, Civil engineering.
Identifiers: *Hartland Dam(Vt), *Side-channel spillways, *Ottauquechee River(Vt).

The hydraulic performance of the side-channel spillway for North Hartland Dam was studied by means of a 1:50-scale comprehensive model that reproduced portions of the forebay area and earth dam, spillway approach, uncontrolled spillway, and chut-type exit channel. An estimated peak discharge of 30,400 cfs occurred at the project site in 1927 and is the maximum historical flood. The project design flood has a peak outflow discharge of 171,000 cfs. The outlet works will be capable of passing 10,100 cfs at maximum pool with one gate inoperative, thereby reducing the required instantaneous spillway discharge to 160,900 cfs. Tests of the original design spillway, which featured a straight, 450-ft-long crest, indicated that performance was satisfactory after realignment of forebay excavation upstream from the left abutament. A study of an L-shaped spillway was made after a cost analysis revealed that considerable savings would result by its use if the left abutament of the earth dam was realigned and the spillway axis were moved approximately 200 ft downstream. The tests showed that an L-shaped spillway with an over-all length of 464 ft, vertical right abutment, realigned excavation along the left bank, and minimum chute lining satisfied all hydraulic requirements. (Sims-ISWS)
W76-04114

MODEL STUDY OF THE SPILLWAY AND TUNNEL FOR DORENA DAM, ROW RIVER, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 404, $7.75 in paper copy, $2.25 in microfiche. Report No 11-1, November 16, 1942. 203 p, 183 fig, 18 tab, append.

Descriptors: *Model studies, *Hydraulic models, *Dams, *Tunnels, Structures, Hydraulic structures, Tunnel hydraulics, Spillways, Outlet works, Dam design, Hydraulics, Civil engineering.
Identifiers: *Dorena Dam(Ore).

At the extreme right end of Dorena Dam, which is a part of the Willamette Basin Project of Oregon, an overflow spillway, stilling basin, and outlet works will furnish flood control and increased low-water flow for the Coast Fork and Willamette Rivers. The spillway with a crest length of 188 ft and a height of 121 ft was designed to pass flood flows up to a maximum of 95,400 cfs. The model study of the spillway and tunnel, for Dorena Dam was conducted at the Bonneville Hydraulic Laboratory, Bonneville, Oregon. The general purpose of the study was to determine by means of a 1-to-50 scale model the hydraulic characteristics of the originally-designed spillway, stilling basin, and outlet works of Dorena Dam and to develop satisfactory alternate designs for any of the features found to be hydraulically inadequate. The model study was responsible for effecting changes in the design of the first approach wall, left abutment, chut sidewalls, bucket, baffle system, tunnel and lip air vents, and the tunnel outlet. The hydraulic characteristics of the outlet tower and of various designs of the approach apron floor elevation, crest profile, chute, stilling basin floor elevation, and end sill were determined so as to establish their worth. (Sims-ISWS)
W76-04115

REVISED STILLING BASIN, BONNEVILLE DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 321, $5.00 in paper copy, $2.25 in microfiche. Technical Report No 65-1, July 1958. 89 p, 45 fig, 22 tab, append.

Descriptors: *Model studies, *Hydraulic models, *Spillways, *Bonneville Dam, *Columbia River, Dams, Baffles, Settling basins, Concretes, Structures, Hydraulic structures, Erosion, Scour, Cavitation, Fluid mechanics, Hydraulics, Cjvil engineering.

Bonneville Dam spans the Columbia River between the states of Oregon and Washington approximately 145 miles from the Pacific Ocean. When it was designed and constructed, the spillway for Bonneville Dam was unprecedented insofar as the magnitude of flow was concerned; the adopted plan was based on results of more than 170 experiments in a hydraulic model. Full operation of the spillway began in April 1938. Underwater inspections made during 1939 revealed considerable erosion of the cavitation type on the sides and at the downstream corners of the baffle piers. Damage to the baffle deck and erosion in the exit channel increased so rapidly during the period 1948 to 1952 that major repairs were considered imperative. Uncertainties regarding the cause of the damage, and the need for determining the best method for revising the stilling basin to minimize future maintenance, led to the conclusion that model studies and an analysis of past operational procedures would provide the best solution to the problems involved. Studies of more than 20 alternative stilling basin plans indicated that the existing design could be improved by streamlining the upstream row of baffle piers and converting the downstream row to a solid sill having the same dimensions as the baffles of original design. (Sims-ISWS)
W76-04116

SPILLWAY PRESSURE HEAD INVESTIGATION, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREG.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 402, $4.00 in paper copy, $2.25 in microfiche. Report No 3-1, July 25, 1941. 31 p, 18 fig, 3 tab.

Descriptors: *Model studies, *On-site investigations, *Pressure head, *Bonneville Dam, *Columbia River, Dams, Spillways, Hydraulic models, Instrumentation, Piezometers, Measurement, Pressure, Hhyraulics, Gates, Spillway gates, Structures, Hydraulic structures, Civil engineering.

The purpose of the Spillway Pressure Head Investigation was to observe the pressures on the crest of the spillway dam at Bonneville, Oregon, and to make comparison of these prototype data with similar model data. It was shown that with the gate in the downstream position, negative pressures (less than one atmosphere) scarcely exist on the spillway crest. With the gate in the upstream position, however, increasing negative pressures on the crest are shown to obtain for at least all gate openings up to 4.00 ft. The results of the prototype tests with the gate in the downstream slot compared fairly well with both those of the 1:36-scale model and the 1:5-scale model. With the gate in the upstream slot, however, discrepancies between the pressure observations of the prototype and the 1:5-scale model were quite evident in certain areas; a satisfactory comparison existed in other areas. (Sims-ISWS)
W76-04118

HIGH VELOCITY CHANNEL, SOUTH FORK COEUR D'ALENE RIVER AT WALLACE, IDAHO.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 340, $5.50 in paper copy, $2.25 in microfiche. Report No 139/1, November 1969. 110 p, 83 fig, 12 tab.

Descriptors: *Model studies, *Hydraulic models, *Channel flow, *Idaho, Channeling, Channels, Rivers, Open channels, Concrete-lined canals, Flow, Streamflow, High flow, Velocity, Hydraulics, Civil engineering.
Identifiers: *Coeur d'Alene River(Idaho), *Wallace(Idaho), High-velocity channels.

This report covers the hydraulic model study of a paved, high-velocity channel for the South Fork of the Coeur d'Alene River through Wallace, Idaho. The proposed design of the paved high-velocity channel was satisfactory and adequate except at the upstream ends of the existing channel walls, where the south wall and a section of the north bank must be increased in height. Because the existing structures are adequate, the proposed modifications to the channel under the Bank Street arch bridge and the north wall upstream from the bridge are not necessary. If the end of the south wall were raised, the upstream end of the paved channel, which was designed for a discharge of 5325 cfs, would have a capacity of 5900 cfs. The size and extent of a riprap proposed for protection at the downstream end of the channel can be reduced. The proposed Corps of Engineers confluence for Placer Creek was satisfactory for all design conditions. The existing confluence and culvert would satisfactorily pass 1960 cfs, the ex-

isting capacity of the creek channel upstream from the culvert, if the proposed north wall of the river channel opposite the creek were higher. By raising a greater length of the north channel wall, the existing confluence and culvert would be adequate to pass the design discharges of the proposed Corps of Engineers flood control project for Placer Creek. (Sims-ISWS)
W76-04119

MODEL STUDY OF THE 23-FT. OUTLET TUNNEL FOR MUD MOUNTAIN DAM, ENUMCLAW, WASHINGTON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 303, $5.50 in paper copy, $2.25 in microfiche. Report No 6-1, July 15, 1942. 101 p, 103 fig, 4 tab.

Descriptors: *Model studies, *Tunnel hydraulics, *Hydraulic similitude, Tunnels, Diversion tunnels, Dams, Tunnel design, Structures, Hydraulic structures, Outlet works, Hydraulics, Civil engineering, Hydraulic models.
Identifiers: *Mud Mountain Dam(Wash).

Mud Mountain Dam, authorized under the Flood Control Act of June 22, 1936, is located on the White River about 25 miles to the east of Tacoma, Washington. The primary purpose of Mud Mountain Dam is to protect the Puyallup Valley and the Tacoma industrial district against flood waters that originate on the north slopes of Mt. Rainer. Detention of peak river discharges in the reservoir and slow release of these waters through regulating valves constitutes the general operation plan of the project. The model study of the 23-ft outlet tunnel for Mud Mountain Dam was conducted at the Bonneville Hydraulic Laboratory, Bonneville, Oregon. The general purpose of the study was to investigate the hydraulic characteristics of the tunnel and its appurtenances as designed, by means of tests performed on a 1-to-25 scale model. The results of these tests were described in detail, and recommendations concerning the design and operation of the tunnel were made. (Sims-ISWS)
W76-04120

NAVIGATION LOCK FOR MCNARY DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A 000 301, Price $6.75 in paper copy, $2.25 in microfiche. Report No. 26-1, May 1955. 172 p, 79 fig, 14 tab, append.

Descriptors: *Model studies, *Hydraulic models, *Locks, *Dams, *Columbia River, Structures, Hydraulic structures, Navigation, Valves, Hydraulics, Flow control, Engineering structures, Civil engineering.
Identifiers: *McNary Dam(Wash Ore).

McNary Dam is an important unit in the comprehensive plan for the development of the Columbia River Basin. This combined power-and-navigation structure is now under construction approximately 196 miles upstream from Portland, Oregon, and is near the town of Umatilla, Oregon. Model studies of the navigation lock for McNary Dam were conducted at the Bonneville Hydraulic Laboratory, Bonneville, Oregon, for the Portland and Walla Walla District Offices. The general purpose of the studies was to develop, by means of a 1:25-scale model of the lock and a 1:20-scale model of a tainter valve, a satisfactory and economical design for the lock hydraulic system. The hydraulic system that was adopted as a result of the model studies will fill the 86-ft-wide by 675-ft-long lock in 16.1 min and will empty it in 15.7 min under a head of 92 ft (normal pool Elev 340; minimum tailwater Elev 248). (Sims-ISWS)
W76-04121

MODEL STUDY OF THE BONNEVILLE NAVIGATION CHANNEL, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Report No. 2-1, January 30, 1942. 137 p, 134 fig, 4 tab, append.

Descriptors: *Model studies, *Navigation, *Bonneville Dam, *Columbia River, Flow, Channel flow, Velocity, Currents(Water), Hydraulic models, Navigable waters, Dams, Spillways, Channels, Channel improvement, Rivers, Dredging, Hydraulics, Civil engineering.

The model study of the Bonneville Navigation Channel was conducted at the Bonneville Hydraulic Laboratory, Bpnneville, Oregon. The general purpose of the study was to determine the best improvement plan to eliminate hazardous currents at the entrance to the downstream lock approach canal and to provide an efficient tailrace channel with a minimum of head loss and shoaling at the channel exit. Bonneville Dam, located on the Columbia River at Bonneville, Oregon, consists of a spillway, powerhouse, and navigation lock. The powerhouse will ultimately have ten turbine-generator units with a designed capacity of 518,400 kw. The navigation lock (76 ft wide and 500 ft long) is designed to lift ocean-going vessels a maximum of 66 ft to the upper pool, where they may then travel upstream to The Dallas, Oregon. The results of the model study showed that two major excavations should comprise the recommended improvement plan. The present powerhouse tailrace channel should be excavated (1,550,000 cu yds). Garrison Point on the Washington shore opposite the entrance to the downstream lock approach canal should be cut back. (Sims-ISWS)
W76-04122

MODEL STUDY OF THE WILLAMETTE FALLS LOCKS, OREGON CITY, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD A 000 403, Price $7.50 in paper copy, $2.25 in microfiche. Report No. 8-1, June 10, 1941. 180 p, 134 fig, 13 tab, append.

Descriptors: *Model studies, *Hydraulic models, *Locks, *Oregon, Waterfalls, Rivers, Navigation, Structures, Hydraulic structures, Hydraulics, Hydraulic properties, Siphons, Civil engineering.
Identifiers: *Willamette Falls Locks(Ore), *Willamette River.

The Willamette Falls Locks are situated on the west bank of the Willamette River opposite Oregon City, Oregon. These locks are five in number, and together with a canal, or lock basin, they form a waterway which passes through the congested industrial area around Willamette Falls. Four of these locks, located at the downstream end of the lock basin, connect that basin with the river below the dam, and a single guard lock joins the lock basin and the upper pool. The lock basin is about 1280 ft long and varies in width from 36 ft to 100 ft. The improvement plan for the Willamette Falls Locks project called for the replacement of the five old and inadequate navigation locks with two 440 ft by 56.08 ft modern locks, the widening and deepening of a connecting lock basin, the installation of a three-barrel siphon spillway for regulating the water-surface elevation within the lock basin, and the construction of a group of intake ports to supply water to the lock basin during highwater season. The general purpose of this study was to determine the adequacy of the features of the improvement plan as originally designed by means of tests performed with a 1:25-scale model. (Sims-ISWS)
W76-04123

SIDE-CHANNEL SPILLWAY AND OUTLET WORKS FOR LOOKOUT POINT DAM, MIDDLE FORK WILLAMETTE RIVER, OREGON, HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA 000 309, Price $5.50 in paper copy, $2.25 in microfiche. Technical Report No. 24-1, November 1961. 102 p, 56 fig, 22 tab, 1 append.

Descriptors: *Model studies, *Hydraulic models, *Spillways, *Outlet works, Settling basins, Channel flow, Channels, Hydraulics, Concrete-lined canals, Conduits, Closed conduits, Valves, Turbulence, Structures, Hydraulic structures, Civil engineering.
Identifiers: *Lookout Point Dam(Ore), *Willamette River(Ore).

The Willamette River watershed, an area 90 mi wide and 165 mi long, is located in western Oregon. The first unit of the initial plan to develop the Middle Fork of the Willamette River was Lookout Point Dam. Model studies of the proposed uncontrolled side-channel spillway and outlet works for Lookout Point Dam were conducted to develop, by means of a 1:72-scale model of the spillway and a 1:25-scale model of the outlet works, satisfactory and economical designs for these elements. Particular attention was given to flow characteristics in the longitudinal channel and stilling basin for the side-channel spillway and to performance of the intake tower, outlet works, and stilling basin for the flood-control and power conduits. Although the spillway functioned satisfactorily as originally designed, excessive turbulence at the curved, 4-on1-sloped upstream end wall and standing waves downstream from the left abutment during the maximum design flow of 375,000 cfs (design discharge plus overcapacity of 132,000 cfs) indicated the need for improved performance of the channel. The turbulence and standing waves were largely alleviated by substituting a vertical end wall for the sloped end wall and eliminating a portion of the conical left abutment. (Sims-ISWS)
W76-04124

SPILLWAY AND STILLING BASIN FOR THE DALLES DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Informati Service, Springfield, Va 22161 as ADA 00 317, price $5.00 in paper copy, $2.25 in microfiche. Technical Report No. 55-1, November 1964. 97 p, 54 fig, 22 tab.

Descriptors: *Model studies, *Hdydraulic models, *Spillways, *Settling basins, Dams, Baffles, Gates, Flow, Velocity, Current(Water), Hydraulics, Structures, Hydraulic structures, Civil engineering.
Identifiers: *The Dallas Dam(Ore Wash).

The concrete-gravity ogee spillway of the Dalles Dam contains twenty-three 50-ft-wide bays separated by 10-ft-wide crest piers. The crest is designed to pass 2,290,000 cfs under a total head of 61.3 ft; the crest shape is designed for 75% of maximum head or 46.0 ft. A 170-ft-long, hydraulic jump-type stilling basin, with one row of 9-ft-high baffle piers and a 13-ft-high end sill, will dissipate excess energy of spillway flows to and including the project design discharge of 2,290,000 cfs. The hydraulic performance of various elements for the spillway and stilling basin was studied in a 1:36-scale model. Tests of the original 27-bay spillway crest indicated that because spillway capacity was about 6% greater than was assumed in design computations, the number of crest bays could be reduced without causing undesirable flow conditions or pressure. Subsequent revisions and tests

resulted in the adoption of a 23-bay spillway that was satisfactory in all respects. The original energy dissipating facilities included a 220-ft-long, horizontal stilling basin 59 ft above mean sea level, two rows of baffle piers, and a 9-ft-high end sill. Model tests conducted with the 23-bay spillway crest disclosed that a 170-ft-long stilling basin at elev 55, with one row of baffle piers and a 13-ft-high end sill would be adequate. (Sims-ISWS)
W76-04125

OUTLET WORKS AND STILLING BASIN FOR COUGAR RESERVOIR, SOUTH FORK MCKENZIE RIVER, OREGON; HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA 000 323, Price $4.50 in paper copy, $2.25 in microfiche. Technical Report No. 87-1, May 1964. 60 p, 28 fig, 19 tab.

Descriptors: *Model studies, *Hydraulic models, *Outlet works, *Oregon, Settling basins, Fish barriers, Spillways, Dams, Reservoirs, Tunnels, Conduits, Channels, Flow, Hydraulics, Turbulence, Baffles, Structures, Hydraulic structures, Civil engineering.
Identifiers: *Cougar Dam(Ore), *McKenzie River(Ore), *Willamette River Basin(Ore).

Cougar Reservoir, a unit of the general comprehensive plan for flood control and other uses in the Willamette River Basin, will be located on South Fork McKenzie River, 4.4 mi above the junction of that stream with the McKenzie River, and about 42 mi east of the city of Eugene, Ore. The regulating outlet, stilling basin, and exit channel for Cougar Dam were studied in a 1:25-scale, fixed-bed model that reporduced a portion of the upper pool, 1057 ft of 13.6-ft-diam tunnel, the chute, stilling basin, and approximately 1100 ft of river bed and pertinent overbank topography downstream from the stilling basin. Results of the tests indicated that flow conditions and pressures in the tunnel, tunnel portal, and open chute of original design were satisfactory during the design discharge of 6000 cfs. Although a hydraulic jump existed in the 30-ft-wide stilling basin for all flows, excessive turbulence and wave action in the outlet channel showed that the stilling basin was too small. Flow conditions were acceptable after the development of a 50-ft-wide stilling basin that contained one row of five 4-ft-high by 5-ft-wide baffle piers and an 8-ft-high end sill. (Sims-ISWS)
W76-04126

THE DALLES DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA 000 316, price $7.50 in paper copy, $2.25 in microfiche. Technical Report No. 52-1, June 1965. 179 p, 136 fig, 9 tab.

Descriptors: *Model studies, *Hydraulic models, *Dams, *Columbia River, Flow, Channel flow, Spillways, Velocity, Currents(Water), Channels, Structures, Hydraulic structures, Navigation, Powerplants, Fish ladders, Civil engineering.
Identifiers: *The Dalles Dam(Ore Wash).

Two hydraulic models were used during the studies. The most desirable layout for the principal structures, minimum excavation requirements, the adequacy of cofferdam and diversion plans, and the probable methods of project operations for initial and ultimate stages of development were investigated in a 1:80-scale general model. Data derived from the general model were used in operation of a 1:25-scale section model in which entrance losses within a typical powerhouse intake were evaluated for different approach flow directions, pier nose shapes, and trash rack designs. Three proposals for improvement of flow conditions at the downstream entrance to the navigation lock were investigated in the general model. A 400-ft-long extension, constructed at an angle of 10 degrees to the downstream end of the present guard wall, was most effective in enlarging the low-velocity area at the approach channel entrance. Tests in the 1:25-scale powerhouse intake model showed that the direction of approach flow had no significant effect on test unit discharge. Six trash rack designs and three pier nose designs were investigated. (Sims-ISWS)
W76-04127

ANTI-HEAVE PROTECTIVE SYSTEM,
Compagnie Generale pour les Developpements Operationnells des Richesses Sous-Marines, Paris (France). (Assignee)
J. E. Lamy.
US Patent No 3,921,408, 5 p, 23 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 940, No 4, p 1669, November 25, 1975.

Descriptors: *Patents, *Waves(Water), *Ocean waves, *Shore protection, Coastal structures, Breakwaters, Engineering structures, Energy dissipation.

A protective system against wave effects on port facilities and offshore facilities is described. It consists of a combination of bulky wall structure having a closed contour for an obstacle. The energy dissipating members comprise a number of beams supported in vertically spaced relation by a number of posts arranged in closed contour around the wall structure. The bulky wall structure is exposed to the impact of successive surges of the heave to induce along the wall structure ascending and descending motions of a mass of water of a thickness greater than a limit layer of water, and the beams are supported at a distance from the bulky wall structure sufficient to dip into the mass of water beyond the limit layer, the beams serving to slow down the ascending and descending motions and phase-shift them with respect to the heave. (Sinha-OEIS)
W76-04264

THE RESONANT INSTABILITIES OF LONG WAVES OBLIQUELY INCIDENT ON A BEACH,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W76-04300

A DIMENSIONLESS NUMBER FOR THE STUDY OF OPEN CHANNEL FLOW,
Regional Engineering Coll., Srinagar (India).
O. N. Wakhlu.
The Institution of Civil Engineers Proceedings, Part 2, Research and Theory, Vol 59, p 515-522, September 1975. 3 fig, 12 ref.

Descriptors: *Dimensional analysis, *Open channel flow, *Flow, *Fluid mechanics, Water properties, Weirs, Hydraulics, Viscosity, Specific weight, Surface tension.
Identifiers: *Thin sheet flow, *Flow over weirs.

In problems of open channel flow, a combination of dimensional analysis and experimental measurement frequently offers the best path to a solution. Open channel flow is largely influenced by fluid properties such as specific weight, viscosity, and surface tension. The proposed dimensionless number combined the effects of these fluid properties. The dimensionless number was found to be significant in the solution of problems of thin sheet flow over steep slopes and flow over weirs; and it may prove useful in other problems of fluid mechanics. (Bender-ISWS)
W76-04303

CALCULATION OF FREE-SURFACE AERATED WATER FLOWS,
V. P. Troitskiy.
Fluid Mechanics-Soviet Research, Vol 4, No 2, p 107-116, March-April 1975. 3 fig, 12 ref. Translated from Gidravlika i gidrotekhnika, No 17, p 56-66, 1973.

Descriptors: *Fluid mechanics, *Hydraulic properties, *Open channels, *Free surfaces, *Roughness(Hydraulic), Head loss, Channel flow, Flow, Hydraulics, Mathematical studies, Aeration.
Identifiers: Self-aerated flow, Fictitious flows, Reduced flows, Rectangular channels.

The relationship existing between the hydraulic variables of steady, uniform, aerated water flow (in a rectangular or almost rectangular channel) was described on the basis of experimental data obtained by others. The concepts of fictitious and reduced flows were introduced. Data obtained in channels having rough as well as smooth surfaces were presented. The aerated flow was nominally subdivided into its different parts, and expressions were presented for each of these. A detailed description was given of the applicability of the different variations of the equations presented to the different cases of aerated flow which can be encountered in free-surface streams. The semiempirical equations derived were in satisfactory agreement with experimental data. Cases in which substantial simplification of the expressions is possible were discussed. (Bender-ISWS)
W76-04306

TWO-DIMENSIONAL MASS DISPERSION IN RIVERS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5B.
W76-04309

DISPERSION OF MASS IN OPEN-CHANNEL FLOW,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2J.
W76-04311

INTERNATIONAL CONFERENCE ON DRAG REDUCTION,
Office of Naval Research, Boston, Mass.
A. D. Wood.
Available from the National Technical Information Service, Springfield, Va 22161 as ADA-006 784, $3.25 in paper copy, $2.25 in microfiche. ONR London Conference Report C-10-74, December 12, 1974. 11 p.

Descriptors: *Drag, *Fluid mechanics, *Conferences, *Reviews, Polymers, Suspension, Flow, Turbulent flow, Laminar flow, Model studies, Fluid friction, Hydraulics.
Identifiers: *Drag reduction.

The International Conference on Drag Reduction was held September 4-6, 1974 at St. John's College in Cambridge, England. The conference was organized by the British Hydromechanics Research Association (BHRA), and paper presentation was by invitation only. This report summarized the principal papers of the conference, covering a wide range of topics, such as: theory of polymeric drag reduction; tests of proposed correlations and scaling theory; polymer degradation; effects of surfactants, fibers, sediments, and compliant surfaces; applications to hydrofoils, turbomachinery, flow measurement, jets; shear stress reduction in blood flow. Reasons for caution in any extrapolations with theoretically-based drag-reduction formulas were cited, and the controversy as to whether this reduction is time-scale or length-scale dependent was discussed. (Sims-ISWS)
W76-04316

RIVER RUN-OFF CONTROL,
For primary bibliographic entry see Field 4A.
W76-04326

8C. Hydraulic Machinery

CAVITATION EROSION DAMAGE IN PUMPS.
AQUA, No 3, p 24, 1975.

Descriptors: *Cavitation, *Impellers, *Pumps, Fluid mechanics, Vortices, *Erosion, *Design, Operations, Bubbles, Aeration, Polymers, Equipment, Materials.
Identifiers: Gas bubbles.

Cavitation is a major problem in the design and operation of fluid handling equipment. Implosion of gas bubbles has the ability to destroy high speed pump impellers. One solution to the problem is the upgrading of the material of impeller construction. However, cavitation-resistant material is prohibitively expensive. Cavitation can be reduced by proper piping design, which specifically is aimed at the reduction of vortices. Work in the Netherlands has shown that cavitation can be reduced by injection of polymers or aeration. Small equipment users find it easier to accept cavitation since flow rates are lower and cavitation damage is not as severe. (Gass-NWWA)
W76-04048

YOUR DOWNHOLE MOTOR: HEY, WHERE'D IT GO.
Drilling - DCW, p 120-124, September, 1975. 9 fig.

Descriptors: *Drilling equipment, Rotary drilling, Drill monitors, Boreholes, Drill holes, Drilling.
Identifiers: *Directional drilling, Vertical inclination(Drilling), *Borehole inclination, *Downhole motors.

Directional drilling came about as an outgrowth of the need to keep boreholes vertical. In some localities, because of geology or drilling techniques some boreholes had inclinations as great as 38 degrees. Thus it became necessary to develop instruments for measuring borehole inclination, and direction of inclination. In the 1930's, evidence came to light that it was sometimes advantageous to allow the borehole to drift from the vertical especially if the angle and direction of drift can be controlled. Methods for getting from the surface location to the downhole target include: utilization of geologic characteristics of subsurface materials; adjustment of bit weight and rotary speeds; utilization of whipstocks and knuckle joints to mechanically alter the bit direction; utilization of drill collars, stabilizers and other drillstem components that achieve desired pendulum or fulcrum effects to alter hole course; or use of a downhole motor. Downhole motors do not require rotation of the drill string. They offer marked advantages in the control of hole angle and direction. Use of a downhole motor requires constant, or very frequent monitoring to assist the driller in keeping track of the bit's course. Two types of steering tools have been developed. One relies on electrical impulses, and the other uses pressure pulses to produce surface readings to describe bit course. The electrical impulse system makes use of an instrument that responds to gravitational pull and the earth's magnetic forces. The pressure pulse system makes use of a pendulum effect to determine bit course. (Gass-NWWA)
W76-04050

SPILLWAY PRESSURE HEAD INVESTIGATION, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREG.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04118

NAVIGATION LOCK FOR MCNARY DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04121

MODEL STUDY OF THE WILLAMETTE FALLS LOCKS, OREGON CITY, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W76-04123

8E. Rock Mechanics and Geology

GEOMECHANICAL INVESTIGATIONS OF THE ROCK BASES OF HYDRAULIC STRUCTURES,
D. D. Sapegin, R. A. Shiryayev, N. M. Karpov, A. A. Nikitin, and L. P. Fradkin.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A002 991, $4.00 in paper copy, $2.25 in microfiche. Translation FTD-MT-24-2382-74, November 1974. 23 p, 14 fig, 25 ref. Translated from Izvestiya Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Gidrotekhnik, No 100, 1972, by Air Force Systems Command, Foreign Technology Division, Wright-Patterson AFB Oh.

Descriptors: *Rocks, *Rock mechanics, *Rock properties, *Dam foundations, Dam construction, Engineering geology, Foundation investigations, Dams, Damsites, Loads(Forces), Stress, Structural stability, Mechanical properties, Bearing strength, Strength of materials.
Identifiers: *USSR, Rock massifs.

During the construction of high concrete dams on rock bases, and also of underground workings with a large cross-section and high-pressure tunnels, the need arises for the fuller use of the supporting power of the rock massifs. In a number of cases the loads which appear during the building and operation of such constructions approach the maximum permissible. Further progress in the field of fuller use of structural properties of minerals is unthinkable at present without comprehensive and sufficiently large-scale investigations of deformability, strength and distributive ability of fractured rock massifs. In recent years considerable attention has been given to the questions of studying the behavior of rock massifs under a load. The data given on the behavior of rock massifs under a load testify to its complex nature and to the considerable influence of many factors on it. The analysis of these data also reveals the incomplete development even of the most important directions in the mechanics of rocks, which indicates the need for the further development of existing directions and methods of investigations of rock foundations of structures. Expansion and deepening of knowledge is needed in the fields of geomechanical properties of rocks, improvement of the methods for the determination of the stress-strain state, strength and stability of rock massifs, and the stability of structures raised on them. (Sims-ISWS)
W76-04323

8F. Concrete

OBTAINING SUCCESSFUL SQUEEZE-CEMENTING RESULTS,
J. L. Rike.
Drilling - DCW, p 107-116, September, 1975. 5 fig, 3 tab, 30 ref.

Descriptors: *Concrete mixes, *Cementing, Bentonite, Concrete additives, Slurries, Technology, Wells, Slurries, Cements, Well casing.
Identifiers: *Squeeze-cementing, Cement slurries.

The technology of squeeze-cementing has been resaonably well defined in the literature, but popular practice of the art does not reflect the technology. Consistent and low-cost successful squeeze-cementing is possible, but an extensive training program is necessary. Habit and experience factors reflecting 50-year-old concepts must be revised. Myths about cement behavior must be replaced with valid concepts. Squeeze-cementing is an operation wherein cement slurry is forced under pressure to a specific point in a well. Uses include the exclusion of water, gas or oil from the producing formation; the recompletion from a depleted or an unwanted interval to a new interval; and the repair of casing or pipe failure. A high-pressure squeeze is utilized when all the perforation holes are filled with mud filter cake. The high-pressure fractures the formation to be squeezed. The fracturing operation removes mud filter cake from the perforation holes so that cement slurry can be placed in the perforation holes and dehydrated against the formation face. The low-pressure squeeze method is used when it is desirable to avoid any fracture of formation face. Low-pressure squeeze operations require smaller equipment than high-pressure operation. Squeeze operations are usually limited to Class A and Class E cements. Depending on requirements of the operation, extenders, retarders, dispersants and accelerators can be used to alter cement characteristics. (Gass-NWWA)
W76-04051

CONCRETE ABRASION STUDY, BONNEVILLE SPILLWAY DAM, BONNEVILLE, OREGON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. of Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 305, $4.00 in paper copy, $2.25 in microfiche. Report No 15-1, October 15, 1943. 39 p, 73 fig, 1 tab.

Descriptors: *Concretes, *Abrasion, *Bonneville Dam, *Columbia River, Dams, Spillways, Baffles, Structures, Hydraulic structures, Erosion, Scour, Laboratory tests, Silts, Concrete testing, Concrete mixes, Concrete structures, Concrete technology, Civil engineering.

The study was initiated in an effort to ascertain the cause of the erosion observed on the baffle piers and deck of Bonneville Spillway Dam on the Columbia River at Bonneville, Oregon. The purpose of the study was: (1) to determine if the erosion of the baffle piers and deck could be attributed to the scouring effect of the silt carried by the Columbia River, and (2) to determine the relative resistance to abrasion of various concrete mixes that dould be used to repair the eroded baffle piers and deck. It was found that abrasion of the abrasion of the concrete of Bonneville Dam by the Columbia River silt load should be considered as a contributing factor in the erosion of the baffle piers and deck of that structure. Concrete made with standard cement had a greater resistance to abrasion by silt-laden water than concrete made with high early-strength cement. (Sims-ISWS)
W76-04111

8G. Materials

NEW JOINT HARD FACING REDUCES CASING WEAR.
World Oil, Vol 181, No 5, p 78, October 1975, 2 fig.

Descriptors: *Casings, Abrasion, Mud, Well casings, Fluid friction, Joints(Connections).
Identifiers: Hardfacing, Casing plus, Reed method, Tungsten carbide, Ground 'smooth', Tool joints, Casing wear.

A new form of tool joint hard metal or hard facing promises reduced casing damage resulting from wear and abrasion in addition to protecting the tool joint. Drill strings with the new process on tool joints produce significantly less casing wear than any of the conventional methods. The new method, called the Reed Method, utilizes conventional hard metal application plus an additional layer of steel alloy. Fabrication requires only a slight additional undercut on the tool joint box end and one additional pass in the hard metal application stage. The product uses standard grainsize tungsten carbide applied with a steel alloy over which about 1/6 inch of additional alloy is deposited. Both layers are fused on by arc-welding machinery and in the process the mild steel forms a second alloy with a portion of the tungsten carbide present to yield a final surface hardness of over 50 Rockwell C. Both tool joints and casing are protected, and somewhat lower drilling torque is required because of the reduced dynamic friction. (Ukayli-NWWA)
W76-04047

STOP DRILL STRING CONNECTION FAILURE,
Exxon Co., Houston, Tex.
S. E. Loy, III, M. E. True, and P. D. Weiner.
Drilling - DCW, p 47-50, December, 1975. 3 fig, 2 tab, 4 ref.

Descriptors: *Drilling equipment, Rotary drilling, *Fatigue(Mechanics), *Failure(Mechanics), *Joints(Connections).
Identifiers: *Drill string connections, Drill collar joints.

Prevention of drill string connection damage and fatigue failure would result in the reduction in the cost of repairing damaged connections, the cost of fishing for lost drill string components or complete abandonment of well and replacement of drill strings. Laboratory tests were conducted to determine what could be done to eliminate or materially reduce drill string connection problems. Field tests were then made to substantiate the laboratory results. It was then concluded that: (1) Rotary shouldered drill collar connection life can be increased substantially by machining external stress relief grooves adjacent to the connection. The relief grooves outside diameter should be that required to reduce the moment of inertia of that section to 30 percent of the moment inertia of the drill collar; (2) Optimum rotary shouldered connection makeup is the torque required to prevent shoulder separation; (3) An analytical method of calculating optimum connection make-up torques was developed; (4) The large number of rotary shoulder connection types and sizes can be reduced if the design criteria described is utilized. This would result in a reduction in manufacturing costs, reduce the need for a large variety of inventory, and simplify crossover substitutions in field drilling operations. (Gass-NWWA)
W76-04049

DRILL PIPE FAILURES, CAUSES AND PREVENTIONS,
AMF Tuboscope, Inc., Houston, Tex.
W. M. Rogers.
Drilling - DCW, p 125-129, September, 1975. 4 fig, 2 tab.

Descriptors: *Drilling equipment, Drill monitors, Failure(Mechanics), *Fatique(Mechanics), *Corrosion, *Fluid friction, *Mechanical control, Piping systems(Mechanical).
Identifiers: *Drill pipe failure.

The causes of drill pipe failure can be categorized into four broad groups; fatigue, corrosion, mechanical damage, and wear. Fatigue is the most common cause of drill pipe failure. Fatigue ultimately leads to crack development near high load points and areas subjected to stress reversals. Corrosion is the pitting and notching of the drill pipe surface due to atmospheric or downhole environments. In recent years corrosion has been controlled by applying a plastic coating to the inside of the drill pipe. Mechanical damage consists of the outside surface cuts, gouges, hammer marks, slip area crushing and other similar anomalies caused by poor handling and operating practices. Wear is usually evidenced by broad area reduction in body wall thickness where the outside surface of the pipe comes in contact with the wall of the well bore. Drill pipe failures can be reduced by training personnel to properly handle and operate tools and drill pipe, to use the proper grade steel, maintain good mud pH control, frequently inspect the drill pipe and follow established guidelines. (Gass-NWWA)
W76-04052

DYNAMIC PROPERTIES OF SAN BERNARDINO INTAKE TOWER,
California Univ., Berkeley. Earthquake Engineering Research Center.
For primary bibliographic entry see Field 8A.
W76-04107

FIELD CALIBRATION OF FLOW MEASURING STRUCTURES,
Hydraulics Research Station, Wallingford (England).
W. R. White.
The Institution of Civil Engineers Proceedings, Part 2, Research and Theory, Vol 59, p 429-447, September 1975. 12 fig, 2 tab, 9 ref.

Descriptors: *Flow measurement, Fluid mechanics, *Hydraulic structures, *Weirs, *Hydraulic similitude, *Calibrations, Model studies, Laboratory tests, Reliability, On-site tests, Measurement, Open channel flow.
Identifiers: United Kingdom, Compound weirs, Approach conditions, British standard requirements.

Three methods are used in determining performance characteristics of flow measurement structures in open channels: theoretical analysis of geometrically simple structures, laboratory calibration of precision models, and field calibration of existing structures. Five field calibrations were conducted in a program of field studies intended to evaluate laboratory model calibrations in performance prediction, to compare actual and theoretical ratings when simple weirs are compounded into a series, and to assess the importance of good flow conditions immediately upstream of a structure. In two cases of standard design structures, field calibrations confirmed laboratory ratings. Revisions were suggested for design requirements for other cases, and a method was recommended for calculation of flow over compound weirs. (Bender-ISWS)
W76-04302

8I. Fisheries Engineering

FISH PASSAGE FACILITIES, BONNEVILLE DAM: COLUMBIA RIVER, OREGON AND WASHINGTON.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 409, $7.75 in paper copy, $2.25 in microfiche. Report No 66-1, April 1958. 203 p, 91 fig, 22 tab, 43 ref.

Descriptors: *Fish passages, *Fish ladders, *Bonneville Dam, *Columbia River, Fish, Fish barriers, Fish behavior, Fish migration, Fish populations, Structures, Hydraulic structures, Hyraulics, Costs, Operation and maintenance, Civil engineering, Biology.

Bonneville Dam is located on the Columbia River, between the states of Oregon and Washington, approximately 144 river miles from the Pacific Ocean. In 1933, when the planning for Bonneville Dam was begun , those who were responsible for the design of fish-passing facilities were confronted by many serious problems. The new project must include fishways of unprecedented size in order to protect and perpetuate a salmon run that was valued at more than $10,000,000 annually. Despite the pioneering nature of the undertaking, the facilities have functioned satisfactorily during more than 15 years of operation and have served as a guide for similar systems that have been incorporated at other projects. More than 15,115,000 fish of 38 species have been counted as they passed through the fish ladders at Bonneville Dam during the period May 1938 to November 1953. Numerous biological studies have been made to determine: (1) the apparent preferences of various species for specific flow conditions, as reflected by the rate of migration within the fish ladders; (2) the mortality of both upstream and downstream migrants; and (3) the over-all effects of the project upon the fishery. (Sims-ISWS)
W76-04112

FISH FACILITIES FOR MCNARY DAM, COLUMBIA RIVER, OREGON AND WASHINGTON; HYDRAULIC MODEL INVESTIGATION.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 311, $7.75 in paper copy, $2.25 in microfiche. Technical Report No 30-1, June 1960. 218 p, 129 fig, 13 tab, 2 append.

Descriptors: *Model studies, *Hydraulic models, *Fish ladders, *Columbia River, Fish, Fish passages, Fish barriers, Fish migration, Dams, Structures, Hydraulic structures, Hydraulic properties, Civil engineering.
Identifiers: *McNary Dam(Wash Ore).

McNary Dam is located approximately 292 river miles above the mouth of the Columbia River. Model investigations of fish-passing facilities for McNary Dam were concerned with the probable effects of the various structures on fish migrations. Currents in the river adjacent to the fishway entrances and powerhous collection systems, flow conditions within the fish ladder structures, and pressures within the auxiliary water supply conduits and pipe lines were of particular interest. Seven models were used during the investigations: (1) a general model that reproduced to a scale of 1:100 all features of the project; (2) a sectional spillway model that reproduced to a scale of 1:36 an auxilliary water supply conduit and its manifold outlet; (3) two sectional models that reproduced to a scale of 1:16 the downstream entrances, auxiliary water supply systems and typical sections of the Washington fish ladder; (4) two sectional models that reproduced to a scale of 1:10 a typical diffusion chamber and its appurtenant water supply and piping; and (5) a sectional model, in which was reproduced to a scale of 1:1 the inside wall of a typical diffusion chamber within the powerhouse collection system. (Sims-ISWS)
W76-04113

FISH FACILITIES, THE DALLES DAM, COLUMBIA RIVER, OREGON AND WASHINGTON: HYDRAULIC MODEL INVESTIGATIONS.
Army Engineer Div. North Pacific, Bonneville, Oreg. Div. Hydraulic Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 320, $6.75 in paper copy, $2.25 in microfiche. Technical Report No 61-1, June 1965. 151 p, 98 fig, 14 tab.

Descriptors: *Model studies, *Hydraulic models, *Fish passages, *Columbia River, Dams, Structures, Hydraulic structures, Engineering struc-

tures, Fihs ladders, Fish migration, Spillways, Powerplants, Civil engineering.
Identifiers: *The Dalles Dam(Wash and Ore).

The Dalles Dam, located approximately 3 miles upstream from the city of The Dalles, Oregon, spans the Columbia River 192.5 miles from the river mouth. The project is one unit in a system of multiple-purpose reservoirs on the Columbia River for flood control, power, irrigation, navigation, and other benefits. The problems involved in the design of facilities to insure the safe upstream passage of anadromous fish at The Dalles Dam were very complex. Seven hydraulic models, together with full-scale apparatus for testing the effects of rapid decreases of pressure on fish that pass underneath the spillway gates, were used to check the adequacy of designs for the respective elements and to effect revisions if necessary. In addition, full use was made of information gained from operation of Bonneville Dam, McNary Dam, and other major projects in the Pacific Northwest. (Sims-ISWS)
W76-04117

AN IMPROVED CAGE DESIGN FOR USE IN CULTURING CHANNEL CATFISH,
Texas Agricultural Experiment Station, College Station.
J. R. Kelley, Jr.
Prog Fish-Cult. 35(3): 167-169. Illus. 1973.

Descriptors: *Channel catfish, Design, *Fish reporduction, Costs, *Design criteria.
Identifiers: *Fish cages.

Cages were designed for use in experimental and production culture of fishes. Criteria associated with design were: durability, cost, and simplicity of construction. Cages were constructed of welded wire fabric and angle-iron frames.--Copyright 1974, Biological Abstracts, Inc.
W76-04424

ANADROMOUS FISHERIES CONSERVATION DEVELOPMENT AND ENHANCEMENT.
National Marine Fisheries Service, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04448

ATLANTIC BLUEFIN TUNA (THREATENED SPECIES--FISH).
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 6E.
W76-04456

9. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

THE SWISS FEDERAL RATING STATION FOR CURRENT METERS. THE NEW STATION OF 1952,
Eidgenoessisches Amt fuer Wasserwirtschaft, Bern (Switzerland).
H. Bircher.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A000 400, $4.00 in paper copy, $2.25 in microfiche. Army Engineer Division, North Pacific, Bonneville, Oregon, April 1965. 33 p, 38 fig, 24 ref. Translated from Swiss Federal Water Service Publication No 41, 1956.

Descriptors: *Facilitieis, *Current meters, *Calibrations, Laboratories, Flumes, Testing, Testing procedures, Equipment, Instrumentation.
Identifiers: *Switzerland.

This publication was intended to communicate the problem of planning and operating a modern current meter rating station. Although conditions vary from place to place, this information may be useful. In 1896, the first Swiss Current Meter Rating Station at Papiermuehle, near Berne, was put into service. The studies for a new rating station began in the early thirties, but they were delayed during World War II. The final project was accepted in 1948 and the new station was built during 1950-52. In view of the foundation problems for a 140 m long flume, several possible locations in the vicinity of Berne were considered. The ultimate decision was to build it parallel to the old flume because little extra consolidation was necessary for satisfactory foundation. Several meters had been rated in the old flume and, without having been used in the meantime, were recalibrated in the new flume. There was good agreement between the old and new ratings. Epper's hump, inherent to the old flume, was completely absent. Detailed regulations concerning the meter ratings have been established. These regulations are based on all available data, comply with the principles stated above, and guarantee reliable results. (Sims-ISWS)
W76-04327

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

A MULTIDISCIPLINARY APPROACH TO SOLVING COMMUNITY WATER PROBLEMS,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 10D.
W76-04391

10C. Secondary Publication And Distribution

IRRIGATION RETURN FLOW, A BIBLIOGRAPHY.
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5B.
W76-04230

WATER POLLUTION CONTROL DIRECTORATE PUBLICATIONS.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W76-04253

10D. Specialized Information Center Services

A MULTIDISCIPLINARY APPROACH TO SOLVING COMMUNITY WATER PROBLEMS,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sharpe, C. S. Oliver, and J. C. Frey.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-249 814, $5.00 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Information Report No 76, December 1975. 76 p, 6 tab, 5 append. OWRT A-031-PA(1). 14-31-0001-5038.

Descriptors: Water resources, *Decision making, Publications, *Communication, *Pennsylvania, Libraries, *Information exchange, *Water Resources Institute, Community development.
Identifiers: *Technology transfer, *Cooperative Extension Service, *Research results, News releases, Video tapes, Radio, Television, Clipping service.

The rapid integration of water resources research results into water resources management decision making has historically been difficult to achieve. This research attempted to delineate and describe methods and procedures useful in the accomplishment of water resources technology transfer by Water Resources Research Institutes. The Cooperative Extension Service was evaluated as a mechanism for technology transfer through case history studies of actual transfer attempts. The effectiveness of various media including news releases, films, video tapes, radio and television programming and popularized publications were subjectively evaluated. Results indicate that there are many advantages in working with the Cooperative Extension Services, although other organizations in particular Watershed Associations, Conservation Districts, local libraries and environmental regulatory agency personnel also show potential as transfer agents. Subscription to newspaper clipping services also proved to be an effective method of discerning community water problems on a regular basis. Pennsylvania's water resources problems and obstacles to their solution are enumerated. (Sink-Penn State)
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